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THE BEHAVIOUR OF NEW GUINEA STRAINS OF PLASMODIUM FALCIPARUM AND PLASMODIUM VIVAX WHEN CULTIVATED IN VITRO.

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IN a previous communication on this subject[2] a preliminary note described the successful cultivation of *Plasmodium falciparum*. Since then eighteen cultures of this parasite and one of *Plasmodium vivax* have been made. This article will describe in more detail the behaviour of these parasites when cultivated *in vitro* and supply more practical points in the technique employed.

The cultures of *Plasmodium falciparum* were made as control cultures when the effects of various antimalarial drugs on this parasite in culture were being investigated at the Land Headquarters Medical Research Unit, Cairns. The results of this chemotherapeutic work have been referred to in this journal in a report on the researches on "Paludrine",[3] and have been published in detail elsewhere.[4]

Plasmodium falciparum was a more suitable parasite for these cultures than *Plasmodium vivax*, as a greater parasite density was obtained. *Plasmodium vivax* was cultivated to demonstrate that this parasite would develop in the culture medium used for *Plasmodium falciparum*. No attempt was made to cultivate *Plasmodium malariæ*, as the volunteers examined harboured comparatively few parasites even after an illness of several weeks' duration.

Method.

The technique differed little from that previously described. The infected red blood cells were placed in a layer on the floor of a flat-bottomed test tube beneath a column of serum to which glucose had been added. However, as two control cultures and as many as twelve test cultures were made at the same time, a slightly different procedure was followed. Blood from the patient was defibrinated by stirring with a glass rod passed through the cotton-wool plug in a test tube. This rod was bent zig-zag fashion in its lowest two inches, and rotation for five minutes always resulted in defibrination. Glucose was not added to the blood as it was collected. The defibrinated blood was centrifuged for as short a time as necessary. The serum was then placed in the culture tube (eight millilitres in a tube measuring 7·5 by 1·25 centimetres), to which 0·1 millilitre of 50% glucose solution had already been added. The infected red blood cells were then obtained by means of a Pasteur pipette from the bottom of the centrifuge tube, care being taken to avoid drawing up any leucocytes. Three large drops of packed red cells were allowed to fall into the culture tube from the level of the surface of the serum. The tube was twisted to allow of some admixture of the cells with the serum, and the tube was incubated aerobically at 37° C. This constituted the first type of control culture, in which the serum for the culture medium was obtained from the patient supplying the parasites.

A second type of control culture was necessary to demonstrate that the parasite would develop in the serum from another donor. The question of agglutination or lysis of the infected red cells did not arise, as the volunteers used to provide the parasites were selected subjects of blood group O (IV). Serum for this second type of control culture was often collected a week or more before the commencement of cultivation and stored in a screw-capped bottle in a refrigerator without any added antiseptic. It was warmed in the incubator before use. This type of control culture was put up in the same way as the first. There was no difference in the behaviour of the parasites in the two types of control cultures.

The cultures were sampled at sufficiently frequent intervals (usually every four to six hours after the first twelve to sixteen hours) to allow the development of the parasites to be followed and a study to be made of the test cultures at all stages of the schizogonous cycle. The removal of a sufficient amount of serum with the red cells to make a satisfactory thin film was found to be a difficult procedure. Two points of technique made this more easily performed. The Pasteur pipettes were made with a long point, and after flaming, were drawn out to capillary fineness at one point and there broken. This fine tip was placed at the bottom of the culture tube and a small amount of cells and serum was drawn up. The drop was transferred to a clean, freshly flamed slide and mixed by being drawn up again into the pipette. One drop was quite sufficient to make several thin film preparations of the sample. Leishman's stain was used.

Despite the frequent sampling of these control cultures none became infected. The addition to two cultures of 0·5 millilitre of physiological saline solution containing sufficient penicillin to produce a final concentration of ten units per millilitre in the culture did not affect the development of the parasites in any way. Owing to the absence of infection, penicillin was not used as a routine constituent of the culture medium.

Results.

Plasmodium Falciparum.

It was usual to commence a culture of *Plasmodium falciparum* when the patient supplying the parasites had a moderately heavy infection of the order of 100,000 parasites per millimetre of blood. When a count of this order was expected, frequent counts were made so that blood could be taken from the patient at the height of the trophozoite wave. The parasites, then, were small and young rings.

In culture, the small rings were observed to become larger as the cytoplasm increased in amount. At the end of about twelve hours forms were seen with an irregular outline of the cytoplasm and containing some scattered pigment (amœboid forms). With further development and increase in size the parasite became oval or rounded in outline and the cytoplasm and pigment compact. This stage was known as the preschizont, because as yet no division of the chromatin had occurred.

Next the chromatin material increased in amount and became scattered throughout the parasite without definite division. It formed a filigree with here and there a condensation of the chromatin giving a beaded effect. This was known as an early schizont, and it then rapidly developed into a divided schizont with discrete chromatin segments. These segments then divided, and around the chromatin the cytoplasm condensed and a mature schizont containing a variable number of merozoites was formed. The pigment was conspicuous in a mature schizont, forming an oval compact mass. The mature schizont ruptured and released the merozoites and pigment.

The merozoites became attached to other red cells, and after entering them, developed into small rings. As many as eight rings of the second generation—appliqué and small—were observed in one red cell. The second generation of parasites did not develop readily, as they died before they had passed the amœboid stage. No prolonged search was made to see if schizonts developed from the parasites of the second generation, since attention was concentrated on the first generation in the test cultures.

Table I shows the progress of a typical control culture, which was commenced with small and medium-sized rings.

Several other points of interest were noted. Maurer's dots were sometimes seen in infected red cells. There was no increase in size of the containing red cell even in the late stages of schizogony, except that when the red cell contained two schizonts some slight increase was observed. In some cultures the stickiness of the red cells containing trophozoites of *Plasmodium falciparum* was demonstrated by the finding of large clumps of infected red cells. In earlier attempts at cultivation, when the leucocytes were not removed, infected red cells were often seen in clumps around white blood cells of the monocyte variety. No gametocytes were seen to develop in these cultures. Not all parasites of the first generation came to full maturity, as some developed into degenerate forms—usually at the preschizont stage. The total time taken for full development of schizonts appeared to be slightly more than forty-eight hours from the time of the previous schizogony in the patient. Often trophozoites of different ages were present at the commencement of the culture, so that all the parasites did not then develop in parallel. The comparative brevity of the stage of the cycle at which chromatin division and maturation of the schizont occurred was remarkable.

Plasmodium Vivax.

In the culture of *Plasmodium vivax* the trophozoites developed in the same manner as was seen in the peripheral circulation of patients suffering from an attack of vivax malaria due to New Guinea strains of this parasite. The culture studied developed from ring forms through the amœboid and preschizont stages to that of divided schizonts. There was no dispersion of the chromatin as a preliminary stage in its division, as was found with *Plasmodium falciparum*. The original chromatin dot divided first into two distinct particles, and these then underwent further division. Mature schizonts were formed in which the pigment was not such a conspicuous feature as observed in mature schizonts of *Plasmodium falciparum*. The mature schizonts ruptured and liberated the merozoites.

Despite a prolonged search of thin films and of a thick film stained with Field's stain, no rings of the second generation were found.

In this culture the red blood cells containing parasites were larger than the other red cells, especially when the parasites had developed beyond the amœboid stage. Schüffner's dots were seen in many of the infected red cells. The cycle was completed in about forty-eight hours after the previous schizogony in the patient from whom the parasites had been obtained.

Discussion.

No attempt was made to experiment with the culture medium to perpetuate the cultures of the parasites, as the cultures described were controls for another experiment. The method was derived from those described by the earliest workers in this field—Bass and Johns,[9] and Thompson and Thompson.[10] They reported second generations of parasites in their cultures, which progressed much further than the cultures under discussion.

TABLE I.

Age of Culture. (Hours.)	Forms Present in Sample.[1]						
	R.	A.	PS.	ES.	DS.	MS.	Mz.
0	++	−	−	−	−	−	−
13·75	−	+	+	−	−	−	−
20·25	−	−	+	++	+	−	−
26	−	−	+	++	+	−	−
28·25	−	−	−	+	++	+	+
32	+	−	−	−	++	+	+

[1] "+" = forms present; "++" = forms predominating; "−" = forms absent; "R." = rings; "A." = amœboids; "PS." = preschizonts; "ES." = early schizonts; "DS." = divided schizonts; "MS." = mature schizonts; "Mz." = merozoites.

The failure of merozoites in the *Plasmodium vivax* culture to enter new red cells and develop into ring forms is of interest. Kitchen[7] reported that the percentage of reticulocytes infected is much higher than that of mature red cells in *Plasmodium vivax* malaria. Hegner[5] stated that *Plasmodium falciparum* preferred to attack mature red cells. This may explain the failure to obtain a second generation of parasites in the *Plasmodium vivax* culture, whereas a second generation was seen in all the cultures of *Plasmodium falciparum*.

Another difference in the behaviour of the two parasites seen in culture is the method of division of the chromatin in schizogony. In the early *Plasmodium vivax* schizonts the chromatin underwent simple division; but in the early *Plasmodium falciparum* schizonts the chromatin was first scattered through the parasite and then condensed into separate particles, which then divided further.

Trager,[11] who worked with *Plasmodium lophuræ*, stated that morphological findings alone could not be accepted as evidence of survival of the parasites in culture. He injected his cultures into chickens and showed that the parasites survived for ten to sixteen days. None of the cultures described here were injected into human volunteers. It was assumed that the parasites were dying when development ceased and degenerative changes were seen in the parasites in the stained film.

The observation that the serum used in the culture medium need not be fresh shows that no labile substance in serum necessary for the development of the first generation of parasites is present which will disappear during storage for two weeks in a refrigerator.

The failure of the second generation of *Plasmodium falciparum* to develop raises the question of the nutritional requirements of the parasite. Trager[12] improved his original results by adding calcium pantothenate to the cultures. Probably other substances are necessary for the normal continued growth of the parasites *in vitro*. The pH of the medium requires investigation, and also the necessity for aeration of the red cells containing the parasites. Subculture early in schizogony into medium containing fresh red cells would appear to be desirable.

The investigation of the nutritional requirements of the malaria parasites and also their metabolism would lead to a clearer understanding of the mode of action of antimalarial drugs. Seeler[9] showed that, in ducklings, pyridoxine inhibited the action of quinine and "Atebrin" on *Plasmodium lophuræ* and *Plasmodium cathemerium*. If an analogy can be drawn with Henry's explanation[6] of the action of the sulphonamides on the oxidation-reduction enzymes of bacteria, and also with arsenic and the pyruvate enzyme system, then it may be postulated that these drugs act on the malaria parasites by preventing their use of pyridoxine.

The other plasmodia which are pathogenic for man can be cultivated more or less readily. *Leishmania donovani* grows well on Locke-serum-agar medium, and *in vitro* chemotherapy work has been done on these parasites by Adler *et alii*[1] using diamidine compounds of the stilbamidine type. *Entamœba histolytica* and the trypanosomes are more difficult to cultivate, and there appears to have been no investigation of them along these lines.

The literature which has been published shows that the cultivation of malaria parasites still remains a very important problem in parasitology.

Summary.

1. A technique for the satisfactory cultivation of one generation of *Plasmodium falciparum* and *Plasmodium vivax* is described.

2. The behaviour of *Plasmodium falciparum* as seen in eighteen cultures and of one culture of *Plasmodium vivax* is detailed.

3. The cultures of *Plasmodium falciparum* were controls used in an investigation of the effects of antimalarial drugs on these parasites when they were developing *in vitro*.

4. A second generation of parasites was seen to develop in cultures of *Plasmodium falciparum*, but these did not progress beyond the large ring and amœboid forms.

5. No second generation was seen in the culture of *Plasmodium vivax*.

6. The problem of perpetuating a culture of these parasites is discussed with special reference to the investigation of the mode of action of antimalarial drugs.

Acknowledgement.

The Director-General of Medical Services, Major-General S. R. Burston, has given permission for the publication of this article.

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GENITO-URINARY DISORDERS OCCURRING IN SINGAPORE PRISONER-OF-WAR CAMP, WITH SPECIAL REFERENCE TO POLYURIA AND NON-SPECIFIC INFLAMMATIONS.

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THE main object of this communication is to describe a series of non-specific inflammations of the genito-urinary tract in Australian soldiers confined in Singapore prisoner-of-war camps for three and a half years. These observations were made in the Australian section of the combined British and Australian hospital, which held from 2,000 to 3,000 patients at varying times. Physiological disorders, however, deserve mention before the pathological aspects.

Polyuria.

All prisoners of war in this camp suffered from polyuria, which was continuous from the commencement of the enforced Asiatic diet to the resumption of a European diet, and which they had not experienced previously whilst serving in the tropics on normal army rations. No systematic "follow-up" has been made to ascertain whether any permanent renal changes occurred, but all the repatriated personnel with whom I have discussed the matter state that they have resumed their normal micturition routine.

[1] Since this article was written the work of E. G. Ball *et alii* (*Science*, Volume CI, 1945, page 542) has come to notice. These workers have succeeded in cultivating *Plasmodium knowlesi* for up to six generations in a complex medium of inorganic salts and organic compounds including vitamins. W. B. Wendel (*The Journal of Biological Chemistry*, Volume CXLVIII, 1943, page 21) has commenced a study of the metabolic changes in malaria parasites.

TABLE I.

Estimate.	Specific Gravity of Urine.	Frequency of Micturition.	Volume of Urine. (Ounces.)	Volume of Fluid and Semi-Fluid Intake. (Ounces.)
Average	1·006	10	112	90
Limits ..	1·002 to 1·013	4 to 19	57 to 204	40 to 180

The average degree of polyuria may be indicated by the findings stated in Table I, compiled from 50 convalescent patients over a twenty-four hour period.

The urine was universally strongly alkaline in reaction and often contained phosphates.

Manson-Bahr[1] states that the usual daily output of urine in the tropics is 500 to 600 millilitres (17 to 20 ounces).

The diet was completely Asiatic, consisting of 10 to 15 ounces of rice per day, with the addition of one or two ounces of dried fish, a similar amount of palm oil and what vegetables were available. The calorific value varied from 2,500 Calories in the earlier phases to 1,500 in the later. The B_1 and B_2 complex vitamins were deficient, and in the later phases salt was also lacking.

The polyuria was both diurnal and nocturnal, the latter being more pronounced in middle-aged men, when the nocturnal frequency of passing urine (one to four times) was an uncomfortable necessity. It was very labile, being quickly reduced by febrile sweating or extra manual work or by exposure in trucks to hot winds and to a lesser extent by an unexpected increase of protein or salt in the diet. It was rapidly increased by the taking of even small quantities of tea, coffee or potassium citrate.

The rice diet was the undoubted cause, though several factors were probably involved. (i) Rice, when cooked, absorbs four times its volume of water, and this necessitates a larger urinary output. (ii) The small amount of protein in the diet may be a cause. Asiatics living on a very small rice diet do not seem to have polyuria, perhaps because they add a greater proportion of protein to their rice. (iii) There may be a diuretic principle in rice.

Another physiological change natural enough in the circumstances was the diminution in sexual libido and the infrequency of nocturnal emissions.

Pathological Disorders.

Pathological disorders were evidenced by the occurrence in unusual numbers of low-grade types of inflammation in various parts of the genito-urinary tract. The term "non-specific" is applied to them to indicate that they had no gonococcal basis. It is noteworthy that no gonorrhœal sequelæ, such as gleet or chronic prostatitis, were encountered during the prisoner-of-war period.

Chronic non-specific epididymitis was one of the commonest of these conditions. Only 30 patients were listed as being admitted to the Australian hospital, but many more not needing hospital attention remained in the lines or, being in hospital for other conditions, were not listed. Many such cases occurred in the skin wards. The condition occurred insidiously as a non-tender nodule, generally in the upper pole. The testicle remained normal. In about half the cases the vas was uniformly thickened, and in one case the whole cord was swollen and tender, the appearances suggesting lymphatic infective spread. Urine was generally normal on microscopic examination, though occasionally motile organisms were present. The prostate seemed normal on palpation, and there was no dysuria or previous gonorrhœa. No treatment was necessary, as gradual resolution occurred over the course of about three months. Sulphapyridine, "Novarsenobillon" injections and even injections of mercurochrome into the vas seemed to have no effect. At some stage of the condition about 25% of the patients showed evidence of inflammation of other portions of the genito-urinary tract, particularly pyelitis or trigonitis.

Acute non-specific epididymo-orchitis occurred in 37 cases. Many of the men were from Thailand and were grossly debilitated as the result of beriberi, dysentery and starvation. Nearly all these men had scabies. There was a rapid onset of dysuria, pyuria and hæmaturia (visible macroscopically or microscopically) followed in a few days by typical epididymo-orchitis. The few prostatic smears examined disclosed staphylococcal infection. In four at least of these cases suppuration occurred, staphylococci again being recovered from the pus evacuated.

The ætiology of the chronic nodular type is probably similar—a low-grade staphylococcal infection reaching the epididymis via lymphatics from the prostate or bladder. The organisms may have gained ingress to the blood stream from infected skin lesions in the presence of debility.

Non-specific prostatitis occurred alone in 24 cases recorded by the Australian admission and discharge book. Seven of these cases under my personal observation presented somewhat uncommon features. Three of the patients complained of difficulty of micturition and poorness of the stream over the previous two or three months without any urethral discharge, fever or abscess, but with slight frequency of micturition and scalding. At the time of obstruction examination of the urine revealed no "threads" or pus, and the prostate on rectal examination seemed small, firm and not tender. The passage of sounds in each case revealed an obstruction in the region of the prostatic part of the urethra. There was a sensation of a band being broken down. No further urinary obstruction occurred in two and a half years.

The fourth patient presented with overflow retention of urine and fever. The prostate felt normal and a catheter was passed with ease. Within the next three days, however, a prostatic abscess pointed in the perineum and was incised. The pus was thin and watery and the exploring finger broke through "mushy" tissue into the prostate. No organisms were found in direct smear (attempts at culture were not possible); but some low-grade organism was present, as later three metastatic lung lesions thought to be pyæmic abscesses were revealed by X-ray examination. Pleuritic friction was audible over one. These lesions resolved without treatment, and the man eventually recovered with no residual urinary symptoms. (A temporary suprapubic cystostomy had been performed.)

The fifth patient presented with recurrent attacks of mild frequency of micturition and scalding without evidence of obstruction. Rectal examination revealed a small prostate with one tender spot in it, thought to be a low-grade abscess. The urine contained a few pus cells, but no threads. A sound was passed easily, and with this *in situ* rectal examination revealed surprisingly that there was practically no prostatic tissue at all between the rectum and the sound. The symptoms cleared up with rest and sulphapyridine, but slight recurrences took place later.

The sixth patient presented with long-standing diurnal and nocturnal frequency of micturition with occasional scalding and pyuria. Cystoscopy revealed trigonitis and a contracted bladder holding only ten ounces. Rectal palpation with a urethral sound *in situ* revealed similar prostatic disappearance as noted in the previous case.

The condition was regarded as chronic interstitial cystitis arising from previous prostatitis of atypical type.

The seventh patient had had severe dysuria on and off for months without any cystoscopically evident cystitis. When a sound was passed some obstruction at the prostate was encountered, and rectal examination again revealed that the main body of the gland had disappeared. The passage of sounds considerably improved the patient's condition.

The pathology of these conditions is obscure. One can only suppose that the prostate had been the seat of a low-grade chronic infection which had gradually and irregularly destroyed prostatic tissue without producing many symptoms, until a larger degree of necrosis led to a frank abscess or the terminal irregular fibrosis caused obstruction.

Vesiculitis was thought to be the cause of hæmatospermia occurring in two cases in which treatment was being given in the skin ward for extensive tinea.

The Urinary Tract.

Non-specific types of inflammation of the renal pelvis, bladder and posterior part of the urethra were relatively common.

Pyelitis, normally a rare occurrence in young males, was recorded in at least 66 cases. The symptoms were

the usual lumbar pain and tenderness with fever and painless frequency of micturition. The urine contained pus cells, epithelial cells and occasionally motile bacilli, though the reaction was generally alkaline. In acute cases red blood cells were also found. There seemed to be more epithelial cells than normally, and in the urine of two patients undergoing treatment, whole sheets of transitional epithelium were cast off in the urine. Cultures could not be attempted, but staphylococci and colon bacilli were noted in smears despite the prevailing alkalinity. On cystoscopic examination the bladder appeared normal except for a pink rosette around the ureteric orifice of the affected side.

A feature of these cases was that the pyelitis tended to recur at intervals of a few weeks. Also other parts of the genito-urinary tract were often involved either at the time or later on. It was common to find a thickened *vas deferens* or a nodule in the epididymis, either in association with the pyelitis or at a later date.

Cystitis often occurred with pyelitis, but 49 separate cases were recorded. This again is a condition rare in the young male. The usual symptoms of frequency of micturition and scalding with suprapubic tenderness occurred. The urine, as in pyelitis, was prolific in epithelial cells as well as in pus cells, red blood cells and organisms. Cystoscopic examination aggravated the condition, but revealed trigonitis only. The ureteric orifices were normal and no phosphatic incrustations were noted.

Posterior urethritis was thought to be the cause of extreme dysuria in five cases. Urgency of micturition amounting to strangury occurred, with the passage of blood and pus. There had been no urethral discharge and the prostate appeared normal. Trigonitis no doubt was associated.

Sulphapyridine treatment generally cleared up these urinary infections rapidly; simple rest in bed with free fluids certainly did not. Recurrences were common, even after a few weeks in some cases. No doubt a recurring blood stream infection of kidney or bladder was present.

It will be noted that in the foregoing conditions it is the epithelium rather than the interstitial tissue which is involved. Carbuncle of the kidney and perinephric abscess, common concomitants of chronic pyogenic skin infections, did not occur. The frequency, too, with which epithelial cells were found in the urine of these patients might indicate that the urinary epithelium was not normal. It is tempting to suggest that vitamin deficiency, known to be present, may have been a factor. Vitamin *A*, supposed to have a protective influence on epithelium, was deficient only in the first six months before palm oil was supplied; but all the *B* vitamins were deficient for the whole period. What protective action these have on epithelium is not known.

Debility and the frequency of low-grade staphylococcal sepsis are the only known factors in the causation of these non-specific types of inflammation.

Miscellaneous.

Renal colic without detectable calculus was frequent despite the prevailing polyuria. Some 98 cases were recorded. Only 11 cases of proven renal calculi were recorded, though better X-ray apparatus might have revealed more. Oxaluria was associated.

Circumcision was a frequent necessity in cases of scabies, tinea and dermatitis to relieve paraphimosis or to cure the otherwise intractable local condition. Nearly 200 such circumcisions were performed.

An unusual symptom occasionally mentioned was the involuntary escape of a small quantity of urine after otherwise normal micturition. Clinical and cystoscopic examination revealed no abnormality. The symptom disappeared as the debility decreased, so atonicity of the sphincter was blamed for the condition.

Summary.

1. A considerable degree of polyuria was universal.
2. Non-specific types of genito-urinary inflammation were frequent; 66 cases of pyelitis, 30 at least of chronic epididymitis, 37 of epididymo-orchitis, 49 of cystitis and 24 of prostatitis occurred.
3. Debility, low-grade infections arising from skin sepsis and possible vitamin deficiency are suggested as causes.
4. Epididymitis occurred in all degrees, but generally as a single nodule.
5. In several of the cases of prostatitis the prostate was found to have almost disappeared.
6. Renal colic due to oxaluria was common—98 cases.
7. Circumcision was a frequent necessity.

Acknowledgement.

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PROFUSE OR IRREGULAR MENSTRUAL PERIODS IN YOUNG WOMEN: A PRACTICAL PROGRAMME OF TREATMENT.

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EXCESSIVE or irregular menstruation constitutes a frequent problem that will sooner or later harass the doctor in practice, and it is therefore essential to have some organized plan of investigation and treatment.

The observations made in this paper are based largely on experience obtained in the management of such cases in a women's army hospital. During that time over 150 consecutive patients with functional uterine hæmorrhage were examined and treated, and a regimen was ultimately evolved which proved successful in practice.

The first part of this communication is devoted to the method that was found most effective, while the second part is concerned with a discussion of many other modes of treatment that have been advised by different investigators.

PART I.

In this paper I wish to confine myself mainly to the eccentricities of menstruation found in young women, and especially to deal with that type known usually as functional uterine hæmorrhage, or dysfunctional uterine hæmorrhage, or functional menorrhagia and metrorrhagia. This is defined as hæmorrhage from the uterine body in which no organic disease can be demonstrated, and which is not due to general or local disease.

The ætiology of such cases is a disorder of the pituitary-ovarian mechanism. Some of these abnormal endocrine entities, such as *metropathia hæmorrhagica*, are fairly well understood, while knowledge is growing on the subject of other forms of hæmorrhage associated with anovulation and anovulatory menstruation.

It is well at the outset to note that uterine hæmorrhage in the non-pregnant woman may be local, general or endocrine in origin. The constitutional causes such as blood dyscrasias and hypothyreoidism are well known, and also the local causes, such as fibromyomata, chronic subinvolution and carcinoma. Occasionally one of these three great ætiological groups overlaps into the territory of another, as in granulosa-cell carcinoma, which is a local pelvic tumour with endocrine effects as well.

The Recommended Investigation-Treatment Programme.

The history is taken in the usual way. The first difficulty was to assess the amount of uterine hæmorrhage from which the patient really suffered. Some girls would describe "enormous floodings for months"; and yet subsequent investigation showed that they had a hæmoglobin value of 90%. A hæmoglobin estimation was made as a routine measure, to serve as a criterion of the real severity of the blood loss.

The physical examination must be both general as well as local or pelvic, and the cervix must be visualized with a speculum of suitable calibre. It became necessary to draw a line somewhere; so the following standards were adopted before a case was designated as one of functional hæmorrhage: (i) the hæmoglobin value must be 80% or less; (ii) the menstrual periods must last longer than seven days; or (iii) the menstrual periods must be occurring at intervals of less than twenty-one days; (iv) the diagnosis must be supported by diagnostic curettage. This latter procedure is necessary in any controlled series of investigations, so as to eliminate the occasional case in which the pelvic findings may appear relatively normal, but the patient nevertheless has a small uterine polypus or tuberculous endometritis. In older patients carcinoma may be present.

The diagnostic curettage may be carried out, when the subject is suitable, on the examination table of the doctor's surgery, with the aid of local anæsthesia and a cannula type of endometrial biopsy curette. With a little practice a uterus can be well cleared of endometrium with this curette. The curette is of the kind used so frequently in sterility studies. Women of phlegmatic temperament are not unduly disturbed by the procedure, nor are those who have previously undergone some pelvic procedure. The majority of young women unfortunately do not fall into either of these categories. The best time to perform this diagnostic investigation is on the first day of the hæmorrhage. A specimen of the endometrium is sent to the pathologist for the preparation of sections. In the present series of cases, 66% of the patients showed evidence of a proliferative or hyperplastic endometrium, and a further 22% showed abnormalities such as irregular ripening of the endometrium or hyposecretory changes or atrophy. The number of cases was not large enough to stress these percentage figures.

The Treatment of Functional Hæmorrhage by Curettage.

The curettage that is performed primarily as a diagnostic procedure will be found to be also therapeutic. Many of the patients will be found to fall into a fairly regular pattern of menstrual cyclicity and flow if no further treatment is given. This fact has been known for a long time, but has been submerged of late under the flood of enthusiasm for endocrine therapy. The reason for the success of this cure by curettage remains speculative. Treatment by curettage alone is recommended when the disorder has been of slight duration.

The Treatment of Functional Bleeding by Hormones.

In all cases curettage is recommended before a start is made on any hormone treatment. In those cases in which the patient or the parent is distressed at the prospect of curettage on a young girl, I have used ten-day cyclic substitution therapy with œstrogens and progesterone. This combination was arrived at after a trial of several other hormones. The ideal method is as follows: wait until one week after the diagnostic curettage or the natural cessation of menstruation, then administer by mouth one five-milligramme tablet of di-hydro stilbœstrol each evening for a total of five evenings. By giving the tablet late at night, one overcomes any tendency to distress on account of nausea. This constitutes the first five days of treatment. During the next five days—that is, on the sixth, seventh, eight, ninth and tenth days—administer di-hydro stilbœstrol in the same doses by mouth, and give in addition once a day an intramuscular injection of ten milligrammes of progesterone. This finishes the ten-day treatment, and brings the patient to the seventeenth day from the last day of the last menstrual period. During this hormonal interregnum it is highly uncommon for any hæmorrhage to occur. Two to four days after the last injection of progesterone and tablet of stilbœstrol, hæmorrhage from the uterus will begin. By this technique of waiting seven days after the last day of the last menstrual period or curettage, then starting the ten-day substitution therapy, and further waiting another two to four days for the uterine hæmorrhage to occur, one can be fairly sure of promising the patient that hæmorrhage will not occur more often than once every three weeks.

In the case of young women who are likely to want children, it is now an ideal procedure to estimate the "fertility salvage". This is done by performing an endometrial biopsy on the occasion of each menstrual loss and having the material examined to see if the endometrium is secretory. Cyclic substitution treatment should be continued until this happens, in the hope of reawakening the pituitary gland to cyclic activity. In the cases in which children are desired, it is advisable to extend the time during which œstrogens and progesterone are given so as to fall in more accurately with the normal cycle. It may be necessary in these sterility cases to try cyclic gonadotropin therapy. But let us not digress into the treatment of anovulation in sterility, as the subject is long and notoriously unsatisfactory.

I reiterate that for the purpose of engrafting some regularity on the menstrual cycle it is found by experience that the ten-day course outlined above is the minimum course that is satisfactory.

The Emergency Treatment of Functional Hæmorrhage.

From time to time cases of endocrine hæmorrhage will occur in young women, in which the loss is so heavy that signs of collapse occur. The methods of treatment that are available are: (i) curettage and packing with gauze; (ii) the exhibition of œstrogens; (iii) the exhibition of progesterone; (iv) the use of drugs. Curettage is the promptest of these measures and the most effective. It may not be necessary to pack the uterus with gauze. On the whole I came to rely on this method and to discard the others mentioned, as the army was interested in getting its personnel back into the line of duty as soon as possible. The intramuscular injection of a large dose of œstrogen into the cervix or *vastus lateralis* is recommended by many authors, especially Karnacky (see Part II). In my experience it lessened the hæmorrhage slowly over a number of days. As speed was a factor to be considered, I gave up using this method. I was unable to obtain efficient hæmostasis by the use of progesterone in a really severe case of acute functional bleeding. Drugs such as hydrastis and ergot have been advised, and a proprietary preparation called "*Liquor Sedans*" is worth a trial when the patient is not losing blood too rapidly. If the hæmorrhage is severe, I advise curettage. The effect is prompt, the diagnosis is verified, the patient and her parents are satisfied.

Comment.

It should be stated that almost all the patients in the present series spent at least two weeks at a convalescent home at the seaside, where they swam, sat in the sun, rested, and were supplied with a generous mixed diet. The constant endeavour was to make the woman an efficient soldier with a minimum of delay, expense and stay in hospital.

Reports of Cases.

CASE I.—A member of the Australian Women's Army Service was aged twenty-one years and married. She was admitted to hospital in October, 1944, suffering from menstrual periods that had lasted for six days and had come on every two weeks during the last three months. Menstruation had previously been normal, coming on every twenty-eight days and lasting for five days. Some dysmenorrhœa had always been present.

On examination of the patient, no constitutional abnormality was found. The uterus was hypoplastic and measured two inches in length by the sound. The hæmoglobin value was 80%.

Diagnostic curettage was performed at the onset of the next menstrual period, which was two weeks after the previous period. An endometrial biopsy revealed proliferative (non-secretory) endometrium. The next menstrual period after the curettage occurred in twenty-eight days' time and lasted five days. The patient was discharged to her unit.

She was readmitted to hospital in July, 1945, with a history that her menstrual periods had remained normal for four months after she left the hospital on the last occasion, and that then they had become progressively more frequent until now they were coming on again at intervals of two

weeks, as previously. She had therefore reverted to the condition present in the previous October, which had been cured for four months by simple curettage. Curettage was again performed at a time when a menstrual period was due, and a course of testosterone was begun, ten milligrammes being given three times a week. On the sixteenth day after curettage hæmorrhage began again, and this period lasted five days.

The cyclic substitution therapy with œstrogen and progesterone was then instituted one week after this menstrual period ceased. The next uterine hæmorrhage commenced in twenty-two days, and the loss was normal. Endometrial biopsy indicated a secretory endometrium. The same treatment was continued for a second cycle. This menstrual period was normal, and she was returned to her unit. When the patient was last heard of, her menses were occurring at intervals of between twenty-two and twenty-eight days without further injections. The only other treatment she had was two weeks at a convalescent home (rest, sunshine, vitamins).

Comment.—The ideal procedure in this case would have been to follow her up with endometrial biopsies to see if her "fertility" had been "salvaged".

CASE II.—A member of the Australian Women's Army Service, aged nineteen years, was single. She said that her menstrual periods had been irregular in onset and duration since they began at the age of twelve years. They occurred every three weeks and lasted ten days. She had been treated by doctors several times with "tablets".

On her admission to hospital, she was menstruating for the fourteenth day in succession. No constitutional or pelvic abnormality was found. Her hæmoglobin value was 66%. When curettage was suggested, she said that she had been told by her mother never to have it done.

She was left at rest in bed, and the hæmorrhage ceased in two days. No treatment was given for the next seven days, and then the usual ten-day cyclic substitution therapy was commenced. Three days after the last injection and twenty days after the last menstrual period she menstruated for five days. This *régime* was repeated over another menstrual cycle, and her next menstrual period occurred in twenty-four days and lasted for five days. She then went to the convalescent home and was given an iron tonic. Her menses have been satisfactory for the last five months.

Comment.—This type of treatment involving the use of hormones without curettage will be useful in private practice, where objections may be raised by the mother against such an operation. In a case like this the diagnosis of the functional nature of the hæmorrhage can only be a presumption, and one must be prepared to revise it. (*Vide* Case III, placental polypus.)

CASE III.—A member of the services, single, was aged twenty-one years. She said that her menstrual period had begun fourteen days earlier at the expected time, and that previously her menstrual cycle had been normal. No amenorrhœa had occurred.

On examination, no constitutional disorder and no definite pelvic abnormalities were present other than the hæmorrhage. The hæmoglobin value was 70%. As hæmorrhage continued, a diagnostic curettage was performed and a small piece of tissue about half an inch in diameter was removed with the curette. This appeared on macroscopic examination to be an old placental polypus. This suspicion was confirmed by the pathologist. The patient again denied the remotest possibility of pregnancy and the occurrence of any amenorrhœa.

Comment.—This patient may have been treated indefinitely with hormones without improvement. The case shows the inherent danger of assuming that menstrual excess is due to a functional cause.

PART II.

> The control of functional uterine bleeding is not easy and the results of conservative treatment are not particularly good. This is especially true in adolescents and young women.
>
> —GREENHILL.[1]

It is the purpose of this section to enumerate briefly the modes of treatment available for attacking functional uterine hæmorrhage other than the method recommended in Part I of this paper, and furthermore to give some indication of the status and efficacy of these various therapeutic approaches.

The methods of treatment that have been used are: (i) surgery; this may be conservative, such as curettage, or radical, such as hysterectomy; (ii) radiotherapy; in this connexion either radium or deep X rays may be used; the latter may be used in heavy doses for purposes of sterilization or in light doses for "stimulating" the gonads and pituitary; radium may also be used to obtain permanent or temporary amenorrhœa; (iii) hormones and vitamins; these include thyreoid extract, œstrogens, progesterone, gonadotropins (or gonadotrophins) and testosterone amongst the hormones; vitamins that have been described as helpful are the *B* complex, vitamin *C*, and finally vitamin *K* and also vitamin *E*.

Surgical treatment must not be more radical than curettage in the case of young women in whom the reproductive function is important. It is a useful and efficient therapeutic agent, and in any series of controlled cases it is essential as a diagnostic procedure. In the case of women of a later age group (over forty years or over thirty-five years) with a family, hysterectomy is a certain cure; it is generally considered to be less radical than the application of radium with its occasional undesirable sequelæ of stenosis and discharge, and with its further disadvantage that it often precipitates a severe menopause.

Radium is generally held to be unsuitable for the treatment of functional hæmorrhage in women of the lower age group. Even when given in substerilizing doses with the object of stopping the menses for a number of months only, it has been known to cause permanent sterility. Cuscaden, of Melbourne, recommends its use for young women in doses of 50 milligrammes for about sixteen hours, shielded by 1·8 millimetres of platinum and rubber-covered.[2]

Light-dosage irradiation of the pituitary and ovary has been suggested and used in America.[3] This method is still in a developmental stage, and the remote effects of irradiating a "master" gland such as the pituitary with its numerous functions are not yet well enough known for this method to be used haphazardly. In addition, the ultimate result of "irradiating" the ovary is not yet certain with regard to the effect on future offspring. For the present this method must be considered experimental.

Hormone therapy in the form of thyreoid extract is held by many experienced gynæcologists to be a useful adjunct in treating functional hæmorrhage. It was not used in the present series of cases unless there was evidence of hypothyreoidism. "In the overwhelming majority of cases of functional bleeding, however, no thyreoid element appears to be concerned and thyreoid therapy is of no value."[4]

Œstrogens may be given alone or in combination with progesterone. Œstrogens alone are used by several workers, notably Karnaky, of America,[5] who uses large doses, and this procedure has been criticized as undesirable.

The use of progesterone alone has been a failure in my experience, unless the endometrial biopsy indicated that a relative hyposecretory state was present in the endometrium. Gonadotropins are of doubtful value. They are difficult to store in hot country areas, and they may cause allergic side-effects in any case. Hamblen prescribes equine gonadotropin in the first half of the menstrual cycle and chorionic gonadotropin in the second half, in sequential fashion. He states[6] that he has obtained "51·7% . . . of specific responses to this therapeutic schedule".

Testosterone is a two-edged therapeutic sword, which gives good results, but is likely to cause side-effects such as hirsutism, alteration of the voice and enlargement of the clitoris. Novak[7] states that "it has yielded more satisfactory results in my hands than either progesterone or the pregnancy urine preparations". He gives ten milligrammes three times a week. My experience with it was rather frequently like that described in Case I in Part I of this paper.

Another hormone for which success has recently been claimed is prolactin, but I have had no experience with it.

The vitamin *B* complex has been used with some satisfaction,[8] and it is worthy of comment that all my patients treated by the method outlined in Part I also had two

weeks' holiday at the seaside in the sun, and were supplied with a full and varied diet including fresh fruit, vegetables and dairy products. This vitamin factor may have entered into the ultimately successful results that were obtained in these cases. Vitamin *B* is stated to assist the liver to function normally in dealing with œstrogenic hormones.

Vitamin *K*[9] has been used, on the supposition that some patients with functional menorrhagia and metrorrhagia are suffering from a deficiency of prothrombin owing to defective liver function. My facilities at the time did not allow me to make prothrombin estimations, and so I leave this therapeutic suggestion with an open mind.

Shute has recorded that vitamin *E* has been satisfactory in the cure of functional bleeding.

Snake venom has been used by Goldberger and Peck[10] for the emergency treatment of hæmorrhage of endocrine origin. It is said to have an effect on the walls of the smaller blood vessels and to make them more resistant to bleeding.

It will be apparent that multitudinous and varied treatments have been suggested by investigators for the cure of this complaint, and for this reason it has been my main purpose to present in Part I an investigation-treatment programme that I have found effective—one that is applicable by any doctor, and is not prohibitive in cost to the patient.

The emphasis throughout has been placed on the type of patient most likely to harass the medical man—namely, the adolescent girl or the young woman who is in her early reproductive era, and in whom the conservation of child-bearing function is paramount and essential. Concurrently the treatment of functional bleeding in women of the later age groups has been mentioned as shortly as possible, because this aspect of the subject is well known to the medical profession.

Summary.

1. Experience in the treatment of over 150 consecutive patients suffering from functional hæmorrhage among members of the women's services is presented.

2. A general physical examination is essential in the case of patients suspected of exhibiting functional hæmorrhage, in order to exclude diseases such as blood dyscrasias, hypothyreoidism, hypertension *et cetera*.

3. Inspection of the cervix and bimanual pelvic examination are also indispensable. The latter can be made *per rectum* with a little practice.

4. Diagnostic curettage is essential before the diagnosis of functional hæmorrhage is acceptable, to exclude a small polypus, tuberculous endometritis, carcinoma *et cetera*.

5. Functional hæmorrhage in young women is often cured for a considerable length of time by curettage alone. This method has been known for years, but has been submerged of late under a flood of enthusiasm for endocrine preparations.

6. If the condition recurs after curettage, I recommend cyclic substitution therapy compressed into ten days, synthetic œstrogens and progesterone being used.

7. Severe functional hæmorrhage in young girls may cause collapse. I found curettage the most prompt cure for this acute condition, and better than either hormones or drugs.

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ADVANCES IN THE SURGERY OF HAND INFECTIONS, WITH SPECIAL REFERENCE TO PAD INFECTIONS.[1]

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MUCH of the subject matter of this lecture on hand infections was presented at a previous post-graduate lecture and printed in THE MEDICAL JOURNAL OF AUSTRALIA, June 10, 1939. It may, however, be useful to publish the fruits of further experience, gathered since that time.

Pad Infections.

I use the name "pad infections" for the subcutaneous infections which tend to become localized in the palmar fatty pads. These infections are important because they are common and because they are often mistaken by the inexperienced for tendon sheath infections. Pad infection I, the so-called "felon", involves the distal phalangeal pad. It tends to cause osteomyelitis of the distal phalanx. It is well known and needs no further description. Pad infections II and III are not so well known. They involve the middle and proximal phalangeal pads respectively. These infections are often mistaken for teno-synovitis. The tendon sheath may in the early stages contain a clear serous effusion. Suppurative teno-synovitis may occur as a later complication. Pad infection IV involves the pads in the distal part of the palm, and it may spread to the web. It is usually due to infection occurring beneath a callosity, whereas infection in the first three pads is usually due to a puncture wound.

Differential Diagnosis.

Pad infections II and III may be distinguished from acute suppurative teno-synovitis by the following differences.

1. In acute suppurative teno-synovitis the swelling of the finger is uniform and the finger is sausage shaped; the area of tenderness corresponds with the tendon sheath, from the distal palmar to the distal digital crease, and is sometimes most pronounced proximally; attempts at passive extension cause immediate and severe pain and resistance.

2. In pad infections II and III the swelling is most pronounced over the affected pad and the finger is spindle shaped; tenderness is most pronounced over the affected pad; passive extension causes pain and resistance, but this is less prompt and less severe than in teno-synovitis, and is often preceded by some degree of free, painless movement.

Figure I shows the typical shape of the fingers in pad infections I, II and III (the little, index and middle fingers respectively), and in suppurative teno-synovitis (ring finger).

Treatment.

Incisions required to evacuate pus in pad spaces II, III or IV may be C shaped or cross shaped and are illustrated in Figure I. Care must be taken of the volar digital nerves and vessels, which lie antero-laterally.

Infections on the Back of the Hand.

The commonest infection on the back of the hand is the furuncle, which affects the hair-bearing area. The skin itself bears the brunt of the inflammation equally with the subcutaneous tissues and shows one or more discharging points or pustules, perhaps even an area of destruction, in the depths of which may be seen a greenish-yellow slough.

[1] Based on a post-graduate lecture delivered in Sydney on February 4, 1946.

Erysipeloid Infections.

Beware of hand infections in those handling fish or pigs. An ill-defined area of inflammation spreads diffusely and irregularly from a slight injury. Operation is not indicated, for pus does not form. The infection is self-limited. The condition is not common. Since 1939 two cases have come under my care.

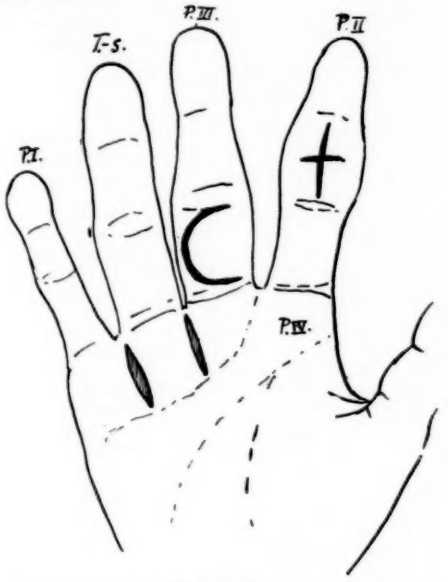

FIGURE I.

Pad Infections. P.I, P.II, P.III, P.IV show the site of infection in the pad spaces. The first three show the typical swelling of the finger. T.-s. shows the sausage-shaped swelling of suppurative teno-synovitis. Incisions for pad infections II and III are shown on the index and middle fingers, and those for suppurative teno-synovitis at the base of the ring finger.

Miscellaneous Points in Treatment.

1. Rest and elevation of the hand above heart level are basic necessities. These cannot be achieved if the patient is ambulant.

2. Splinting of the hand in the position of rest is important (see Figure II (*a*)). A common error in attempting this is to overlook extension at the metacarpo-phalangeal joint as in Figure II (*b*). The splint and the bandages often hide this extension from the unwary eye. Maintenance of the flexed position of the metacarpo-phalangeal joints and of the interphalangeal joints is of profound importance in the injured, infected or paralysed hand. The reason for this is that the heads of the metacarpal bones and phalanges are wider anteriorly than posteriorly. When the joint is in extension the oblique collateral ligaments lie relaxed behind the widest part of the head (Figure II (*b*) and (*c*)). During flexion these ligaments pass forwards and become tight as they lie alongside the widest part of the head (Figure II (*a*) and (*d*)). This can easily be demonstrated by noting the relatively free lateral mobility of these joints in the extended position. If the collateral ligaments become fibrosed while the joint is extended, they may never again pass forwards on the metacarpal heads.

3. Among antiseptics, tincture of iodine retains its importance as a skin disinfectant. If it is desired to use any other antiseptic—for example, proflavine or "Monacrin"—the solution should contain at least 50% alcohol. The aqueous solutions do not wet the skin well.

An antiseptic may be applied to the subcutaneous tissues as a first-aid measure or during the surgical treatment of an injured hand, or by the method of Garrod and Keynes for a prick with an infected needle. For these purposes the prime requirement of the antiseptic is that it should be non-irritant. An aqueous solution of "Monacrin" (5-amino-acridine, or "colourless" proflavine) may be used. If proflavine sulphate is used, it should be buffered by one-quarter its weight of sodium bicarbonate, as advised by Albert. Acriflavine is more irritating and less potent than proflavine, and of inconstant composition.

4. For post-operative treatment the method which I use at present imitates the Winnett-Orr technique. Dressings are changed infrequently, usually once a week. Active movements begin, but are not forced, when the acute phase

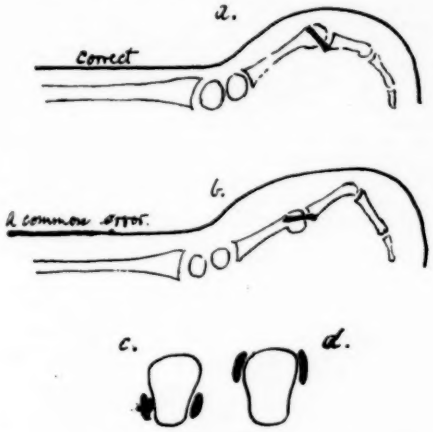

FIGURE II.

Splinting in the position of rest: (*a*) correct; (*b*) a common error; (*c*) articular surface of metacarpal head from distal aspect, showing lateral ligament with joint in extension; (*d*) with joint in flexion.

of the infection is over. Dry heat is applied by a radiator or the infra-red lamp. Passive assistance is not added to the active movements until the wounds have healed.

5. The sulphonamides and penicillin are of course a most important addition. A detailed account of their use does not come within the scope of this paper. They should be used vigorously from the outset in acute hand infections. It is not justifiable to wait until the disease has assumed major proportions. The fear of making organisms resistant has possibly been given undue weight. Resistance is conferred only by prolonged treatment with small doses. Moreover, there is evidence to show that in the phase of temporary resistance the organisms lose power to divide, lose their virulence, and are more easily killed by the body defences (McKee and Houck).

The treatment of acute suppurative teno-synovitis by aspiration of the pus and injection of penicillin has been described by Grossmark and Plewes,[1] who claim to have obtained good results.

6. For the treatment of suppurative teno-synovitis I have used with gratifying results the incisions described by Iselin and by Henry. I believe that these should replace the long incisions described by Kanavel, which inflict greater damage on the tendon sheaths and cross skin creases at right angles, thus encouraging bow-string contractures, and menace the digital nerves. Bunnell has shown the importance of these points.

Iselin, a French surgeon, has likened the tendon sheaths to a thermometer, narrow distally and expanded proximally. He holds that the synovial sheaths can be adequately drained by opening them proximally, just as it is possible to empty the mercury from a thermometer by breaking the bulb. The sheaths of the middle three digits are opened, as shown in Figure I. Two incisions are made in the palm, distal to the palmar flexion line and opposite the space on each side of the digit. *Fasciculi transversi* of the palmar aponeurosis may be seen, and deep to these lie the common volar digital nerves and vessels. The distended proximal end of the tendon sheath is shown by blunt dissection and is opened.

To prevent premature wound closure, an artery forceps is then passed into the wound, its point is exposed by a counter-incision on the dorsum of the web, and a small strip of rubber is then pulled through and left for twenty-four to forty-eight hours. For ulnar bursa infection Iselin uses the incision on the medial aspect of the lower end of the forearm, between the ulna and the tendon of the *flexor carpi ulnaris*. The radial bursa may also be drained through this incision or through one on the radial side just in front of the brachio-radialis tendon, the cephalic vein and the superficial division of the radial nerve being avoided. Forceps are passed laterally and distally in front of the *pronator quadratus* and behind the radial vessels. If, after these incisions are made, pocketing occurs distally, this can be relieved by short incisions, either on the side of the digit or on the medial side of the palm.

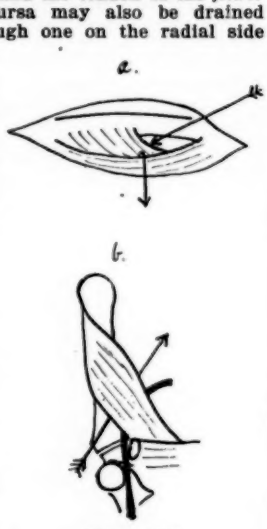

FIGURE III.
Henry's medial palmar approach. (*a*) Abductor drawn forward by hook. Arrow represents director passed under proximal edge of opponens. (*b*) Opponens, with director in place, and deep division of ulnar nerve passing around and under it.

Henry's medial approach to the ulnar bursa also provides effective drainage for the mid-palmar space. The patient lies supine, with the forearm fully pronated, so that the lateral border of the hand is uppermost. An incision is made distally from the triquetrum along the subcutaneous border of the fifth metacarpal. The thin expansion of palmar aponeurosis over the hypothenar muscles is divided and the *abductor digiti quinti* is retracted forwards, the opponens being exposed (Figure III (*a*)). A director is passed under this muscle distally and laterally, so as to ensure the safety of the important deep division of the ulnar nerve, and the muscle is divided (Figure III (*b*)). This step exposes a volar interosseous muscle, closely applied to the shaft of the metacarpal, in front of this the middle palmar space and in front of this the ulnar bursa. If either of the last-mentioned is distended with pus, it is easily seen and opened.

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THE PLACE OF SURGERY IN DISEASES OF THE CHEST.

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FIFTEEN years ago thoracotomy was a hazardous operation rarely attempted as a deliberate method in the treatment of disease. Now it is as safe as laparotomy, and operations on the lungs, œsophagus, mediastinum and heart have become established surgical procedures.

The Lungs.

The surgical approach to diseases of the lungs is based on the principles of (i) collapse, (ii) drainage and (iii) resection.

Collapse is a method largely used in the treatment of pulmonary tuberculosis, and for a long time it was the basis of all surgical treatment for this disease. Recently drainage of cavities has been used in some clinics, and there is an increasing tendency to advise resection for some types of tuberculosis when collapse treatment is unsuitable or has failed.

Drainage finds its chief usefulness in the treatment of empyema and lung abscess. In treating an empyema, an adequate rib resection should be carried out at the right time, and in my opinion intercostal drainage and high-pressure suction are both unnecessary and unsatisfactory in the treatment of empyema. Neuhoff and Tourof[1] have shown convincingly in a series of papers that the drainage of acute lung abscesses is safe and cures a high percentage of the patients. If drainage is delayed, the abscess becomes complicated and multilocular and surrounded by areas of bronchiectasis, and even though the acute illness may have settled down, lobectomy is often required to restore the patient to good health. A lung abscess is as much a surgical condition as acute appendicitis. Although drainage is not always necessary, it should be the surgeon's responsibility to decide if and when operation is required, and to do this he must examine the patient as soon as an abscess is suspected.

Resection is the only effective method of treatment for bronchiectasis, congenital cystic disease of the lung and bronchial carcinoma and adenoma, and for some other less common conditions. Lobectomy and pneumonectomy have become safe operations, and carry no more risk than resection of abdominal viscera. The tourniquet used in the early days of pulmonary resection is now a museum piece, and the meticulous bronchial closure of the dissection technique has practically eliminated the risks of broncho-pleural fistula and empyema that so commonly followed the mass ligation methods of the tourniquet era.

Bronchiectasis and other forms of chronic pulmonary suppuration are cured by resection so long as all the diseased lung tissue is removed. Even when this cannot be done, it is often worth while removing the more severely diseased cesspool lobe, as this may reduce cough and sputum to a negligible amount. When operation cannot be undertaken, nebulization with penicillin will reduce the amount and odour of the sputum and is worth trying as a palliative.

Congenital cystic disease may manifest itself as a solitary cyst or as multiple cysts localized to a lobe or a whole lung or distributed through the lung tissue. Any pulmonary cyst may become infected or may bleed, and solitary cysts which communicate with a bronchus may become tensely distended with air and simulate closely a tension pneumothorax. These balloon cysts may cause acute dyspnœa and cyanosis, especially in infants. Resection is urgently required in the case of an infant with a tension cyst and should be considered in every case in which symptoms are resulting from localized cystic disease.

Bronchial carcinoma accounts for 10% of all primary carcinomata. Symptoms are often trivial, and by the time the diagnosis is suspected the majority of tumours have become inoperable. X-ray examination and bronchoscopy are the only useful methods of diagnosis and should be used when there are any symptoms of lung disease. It is dishonest to reassure a patient complaining of symptoms referable to the lungs unless an X-ray examination has been made. The physician should use this method as frequently as his stethoscope. Only in this way can tuberculosis and cancer be recognized early and treated at a hopeful stage. A fairly large proportion of bronchial carcinomata are visible with a bronchoscope and a biopsy can be taken; but even in the absence of bronchoscopic proof, thoracotomy should be advised in every case in which a carcinoma is suspected. Resection is the only hope for these patients, and in most chest clinics deep X-ray treatment is not used even in inoperable cases. The risk of operation is not high; Dr. J. C. Jones[2] has removed 49 lungs affected by malignant disease, with one death.

Bronchial adenoma is a term used for a type of low-grade bronchial carcinoma that spreads locally, but rarely if ever causes metastases. It is most common in young women and gives rise to hæmoptysis and symptoms due to bronchial obstruction. Bronchoscopic removal of the obstructing adenoma may relieve all symptoms for a

number of years; but in most cases the removal is incomplete and the condition will recur. Lobectomy is usually the treatment of choice for these patients unless the stem bronchus on one side is involved, when a pneumonectomy should be performed.

There are a number of other innocent tumours of the lungs which may cause symptoms, or may be recognized as obscure shadows in routine X-ray films. It is impossible to be sure that any of these shadows is innocent, and thoracotomy with a view to removal should always be advised.

In some cases of spontaneous pneumothorax due to rupture of an emphysematous bleb, the lung fails to reexpand, or the condition may be frequently recurrent. Alexander[3] operated upon a few of these patients, and in each instance he found a localized segment of emphysema with blebs, and cured the condition by resecting this segment.

Another rare but interesting condition requiring resection is arterio-venous fistula occurring in the lung. In 1944 Jones[4] reported a case and found records of four other cases in the literature. Blood from a major pulmonary artery is short-circuited into a pulmonary vein and so returned to the left ventricle without being oxygenated. The patient is more or less severely cyanosed, and this condition is increased by exercise, fingers are clubbed and polycythæmia is present. An X-ray study of the lungs will reveal a vague opacity somewhat resembling atelectasis, and over this area a systolic murmur may be heard. Symptoms depend on the size of the shunt, but eventually the burden on the heart is likely to lead to hypertrophy and failure of this organ. Jones's patient required a pneumonectomy and has since passed through a normal pregnancy and confinement. Sweet[5] has cured two patients by resection of the middle lobe of the right lung, and Adams[6] and Alexander[7] have each encountered similar cases.

Hydatid disease of the lung has been discussed elsewhere, and reference may be had to a paper I wrote in 1939.[8] Resection is rarely required in this disease, but every hydatid cyst of the lung should be removed as soon as it is diagnosed.

The Œsophagus.

In 1913 Torek[9] reported the first successful excision of a carcinoma of the œsophagus. Many surgeons followed his lead, and a few other successful resections were reported. At best, the survivors were left with a skin-lined ante-thoracic œsophagus, and many of them never progressed beyond the stage of a gastrostomy and an œsophageal fistula in the neck through which all the saliva leaked. Most of them found little joy in life. All this has changed. Resection of the lower part of the œsophagus and cardia of the stomach with anastomosis of the œsophagus to the stomach inside the chest was first thought of by Biondi,[10] an Italian, who published the results of experiments on dogs in 1895. Sweet[11][12][13] and Garlock[14] and others have recently developed this technique and have shown that an œsophago-gastric anastomosis can be made in the chest at or above the arch of the aorta. This technique is now applicable to 30% to 50% of all œsophageal carcinomata, and to carcinomata of the cardiac end of the stomach, which constitute 10% of all gastric carcinomata and are inoperable by the abdominal route. The whole stomach may be removed if this is required, and the œsophagus anastomosed to a loop of jejunum. Sweet[15] has used this method of treatment in difficult cases of cardiospasm. In one patient with a lye stricture he excised the impermeable œsophagus and made an anastomosis above the aortic arch.

Innocent tumours may arise in the œsophagus and may be sessile in its wall or pedunculated and within its lumen attached only by a narrow pedicle.

Fibromata, lipomata and leiomyomata have all been described and may grow to a large size. Small, pedunculated tumours may be removed through the œsophagoscope by snaring the pedicle. Harrington[16] and Adams[17] have successfully removed large tumours by deliberate transthoracic œsophagotomy.

Pharyngeal pulsion diverticulum, although not endothoracic, should be included amongst œsophageal conditions that can be relieved by simple surgery.

Congenital atresia of the œsophagus with œsophago-bronchial fistula is a condition in which an upper pouch of the œsophagus ends blindly about the level of the aortic arch and a lower pouch opens into the trachea near its bifurcation or into the right or left bronchus. Affected babies all die of starvation or of pneumonia, which results from regurgitation from the blind œsophageal pouch. Some success has followed multiple-stage attempts to relieve the condition by the following methods: (i) extrapleural ligation of the tracheo-œsophageal fistula; (ii) gastrostomy; (iii) exteriorization of the upper œsophageal segment; (iv) later construction of a skin-lined ante-thoracic tube. Levin,[18] Ladd,[19] Humphreys[20] and others have done pioneer work in this field. In 1943 Cameron Haight[21] reported the first successful case of one-stage closure of the fistula and reconstruction of the œsophagus. He has now operated on 36 babies with nine successes, and each of these successes is an infant's life saved. Operation should be considered in every case as soon as the condition is recognized.

The Heart and Aorta.

The surgery of the heart has always had a great popular appeal. Closure of the patent *ductus arteriosus* was first carried out by Gross[22] in 1938, and many hundreds of these operations have now been performed. Touroff[23] in 1940 was the first to ligate the ductus in a patient with subacute bacterial endocarditis, and this complication has now become an urgent indication for ligation. Penicillin may sterilize the blood stream and should always be used for some weeks before operation in cases of infection, because as the inflammation subsides the inflamed ductus becomes less friable and the operation easier and safer. While it is true that some patients with an uncomplicated *ductus arteriosus* live to a ripe old age, a large number of them die young from endocarditis or cardiac failure. As age increases, the ductus becomes wider, shorter and thinner-walled and the difficulties of operation increase. The risk of operation in children without endocarditis is slight, and closure should always be advised in these cases. If the patient has reached adult life without disability, it may be wiser to await events and to operate at the first hint of endocarditis or cardiac insufficiency. Obviously nothing can be done for the patient whose ductus is compensatory to some other cardiac abnormality. Ligation in continuity is occasionally followed by recanalization, and to avoid this Gross[24] has developed a method of division and suture of the ends of the duct. Jones[25] in Los Angeles and some others have followed his lead.

"Blue babies" with congenital heart lesions are not rare. Many of them die in early infancy, but some of them, including the group with what is known as Fallot's tetralogy, may survive and even reach adult life; but they are usually crippled by dyspnœa. The tetralogy consists of (i) pulmonic stenosis, (ii) a patent interventricular septum, (iii) dextroposition of the aorta and (iv) hypertrophied right ventricle. Only a small proportion of the blood from the right ventricle passes through the lungs, and consequently the oxygen saturation of arterial blood is low. It averaged about 50% in Blalock's series. In May, 1945, Blalock[26] reported three cases in which he had anastomosed a subclavian or an innominate artery to the pulmonary artery with considerable improvement in the patient's condition. He has now performed the anastomosis in over seventy cases, and improvement has been striking in 75% of these. The operation may be considered a worthwhile procedure.

Constrictive pericarditis is a condition in which the heart becomes sealed up in a leathery pericardium that may be calcified. It cannot cope with a normal volume of blood, and its output becomes seriously diminished. High venous pressure, ascites, enlarged liver, a paradoxical pulse and a small, quiet heart are present. The myocardium and the valves are normal, but the heart is imprisoned in the pericardium. The only effective treatment for this disease is excision of the thickened and adherent peri-

cardium. The operation is dramatic in its results and cures a majority of these patients.

Not even the aorta had escaped the surgeon. Gross[27] in Boston and Craaford[28] in Sweden have resected the narrowed section of the aorta in cases of coarctation and successfully anastomosed the divided ends. Alexander[29] successfully resected an aortic aneurysm and ligated the aorta in a case in which anastomotic circulation was already fully developed in consequence of an associated coarctation, and Gebauer[30] has had some success in gradually constricting the aorta proximal to an aneurysm, allowing time for the development of an anastomotic circulation before the vessel is finally obstructed.

Mediastinal Tumours.

Mediastinal tumours and cysts may cause pressure symptoms or may be discovered on routine X-ray examination of the chest. Cysts may leak into a bronchus and become infected. If the cyst is a dermoid, hair may be expectorated. At least 40% of all the rounded and apparently localized shadows discovered in the mediastinum are malignant or will in time become malignant. To avoid these complications, thoracotomy with a view to removal of the cyst or tumour should always be advised.

Diaphragmatic Hernia.

Diaphragmatic hernia may be congenital or traumatic, or may occur through one of the naturally weak spots in the diaphragm. Herniæ of the third group occur commonly through the œsophageal hiatus or the foramen of Morgagni. They have a true sac, unlike the congenital and traumatic types, which have no sac.

Infants born with congenital hernia show symptoms of cardiac and respiratory distress, and intestinal obstruction may develop. Most of them die within the first few weeks of life, and the best chance for them is an immediate attempt to replace the abdominal contents and repair the hernia. It may be difficult to find room in the abdomen for the herniated viscera. Some of these herniæ may best be approached from below, but for traumatic herniæ and those through the œsophageal hiatus—the common hernia of adults—a transthoracic approach should be used.

Pectus Excavatum.

Pectus excavatum, or funnel breast, is usually a deformity of no significance. Sometimes it interferes with cardiac function, and sometimes the deformity worries the patient and causes a condition of psychic unrest and inferiority. In these cases it can be remedied at small risk to the patient.

Myasthenia Gravis.

Even the mysterious thymus has become the target of surgical endeavours. In some way it is related to *myasthenia gravis*, and resection of the thymus is the only method of treatment that has ever cured this serious disease. If there is radiological evidence of a tumour of the thymus or of hypertrophy of the gland, its removal should be recommended, and improvement has followed resection of apparently normal thymus glands. Unfortunately results are uncertain, and it is impossible to foresee which cases will be successful. Blalock,[31] who was a pioneer in this field, and Clagett,[32] who has performed a number of resections of the thymus, believe that the operation is worth while in any progressive cases of *myasthenia gravis*. Geoffrey Keynes[33] recently reviewed his series of 51 thymectomies.

Conclusion.

Even to those who have followed the development of chest surgery the list of achievement here catalogued is surprising, and some mention must be made of the factors which have made these developments possible. Amongst these is radiology, which has provided the means for accurate diagnosis and localization of intrathoracic diseases. The concomitant developments in the use of bronchoscopy and œsephagoscopy have made easy visual recognition of lesions of the major bronchi and œsophagus.

The anæsthetist is one of the most important members of the thoracic team. It is his duty to see that the patient suffers as little as possible from the necessary manipulations of the surgeon, and in addition to administering the anæsthetic drug, he must keep the bronchial tree dry by regular bronchial suction during the course of the operation. With his finger on the patient's pulse, he must anticipate the development of shock and prevent it by the intravenous administration of fluid or blood at the right time. He must be a skilled bronchoscopist and may have to use this skill to clear the bronchial tree of secretion during the operation or at its conclusion. In some clinics bronchoscopy is used as a routine measure after operations on the lung. The anæsthetist's task is arduous, and on his skill the success or failure of the operation may depend. A wide variety of anæsthetic agents and techniques has been used, and whichever one is chosen, it is essential that the patient shall be quiet and relaxed without straining and with adequate oxygenation of his arterial blood.

The pleura, like the peritoneum, has a natural resistance to infection, and provided the closure of a bronchus is adequate, in the majority of cases the chest after pulmonary resection may be closed without drainage and no empyema will develop. Healing without infection may be expected even after resection for putrid bronchiectasis or lung abscess when gross contamination at the time of operation has occurred, provided always that the bronchial stump has been properly closed and hæmostasis is adequate. Despite this we should use all the means at our disposal to reduce infection before operation and to prevent it after operation. The sulphonamides are of undoubted value for some of the pneumonic infections, and penicillin should be used parenterally and by nebulization and locally in the pleural cavity in any case in which operation has been performed on an infected lung. Modern œsophageal surgery is now rarely complicated by mediastinitis or pleural infections, and this fact may be attributed partly to more accurate anastomosis and partly to the prophylactic use of penicillin.

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THE DISTRIBUTION OF FLUORINE IN POTABLE WATERS IN NEW SOUTH WALES AND TASMANIA.

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THE important role of fluorine in normal and abnormal dental development has become well established during recent years, particularly since the discovery of the part played by this element in the ætiology of the condition in teeth known as mottled enamel.

The first description of mottled enamel was by Eager, who observed it in Italy in 1901, although the earliest mention of it was made by Kuhns in Mexico in 1888. The disease is characterized by the abnormal appearance of the enamel, which loses its normal translucency and uniform creamy ivory colour and becomes mottled with patches of chalky white to grey. In severe cases the enamel is pitted and corroded; teeth so affected are brittle and fracture readily; and there may be attrition of the enamel surface. In the most severe cases the mottled enamel may become stained by the deposition of a yellow, brown or black pigment distributed in irregular patches or in more regular transverse bands, mostly on the labial surfaces of the incisors and canines at the lip line. Histological examination reveals that the intercementing substance normally present between the enamel rods is lacking in the outer one-third or one-quarter, and hypocalcification of the enamel rods themselves may be present.

Black and McKay (1916) made the first thorough study of the condition at Colorado Springs, United States of America, and subsequent exhaustive studies by McKay (1930) indicated that the factor responsible for the disease was associated with the common water supply. However, it was not till 1931 that it was simultaneously observed by Smith, Lantz and Smith (1931), Churchill (1931) and Balozet and Velu (1931) that a correlation existed between the incidence of the defect and the fluorine content of the drinking water. The work of Smith, Lantz and Smith at St. David, Arizona, revealed that the changes produced by the ingestion of fluorine took place only during the period of formation of the enamel of the permanent teeth, and that the teeth of children entering the district after the age of eleven years, when calcification was complete, were not affected by mottling. If the third molars are excluded from consideration, the critical period is during the first eight years of life. Further investigations revealed that the minimal threshold concentration of fluorine was in the vicinity of one part per million and that the severity of the mottling or, more correctly, of the chronic endemic dental fluorosis increased with increasing concentration of fluorine in the drinking water above this level (Smith, Lantz and Smith, 1935; Dean and Elvove, 1937). Dental fluorosis has since been reported from many countries all over the world, and analyses of the water supplies have confirmed the finding that fluorine is the toxic factor.

In recent years the mottled enamel problem has been somewhat overshadowed by the observation of an inverse relationship between the fluorine content of drinking water and the incidence of dental caries. Black and Mackay noted that the percentage of carious teeth in Colorado children was less than that in children of other communities where mottled enamel was unknown. Bunting *et alii* (1928) found that the extent and activity of caries were decidedly limited among children in areas where mottled enamel was prevalent. Later studies of mottled enamel, such as those of Masaki (1931) in Japan, Erausquin (1935) in South America, and Ainsworth (1933) in England, also revealed an inverse correlation between the incidence of endemic dental fluorosis and that of dental caries.

The epidemiological studies of Dean and co-workers (Dean, 1938; Dean, Jay, Arnold, McClure and Elvove, 1939; Dean, Jay, Arnold and Elvove, 1941) provide the strongest evidence in favour of a fluorine-dental-caries relationship. In selecting communities for comparable studies they controlled as far as possible all variable factors with the exception of the fluorine content of the common water supply. They considered such variables as climate, latitude, days of sunshine, economic status of the population, diet, sex, colour, age and nativity, and as far as possible employed the same examiners to eliminate the personal factor. A recent study by Dean, Arnold and Elvove (1942) summarizes the dental caries findings in 7,257 selected white school children, aged from twelve to fourteen years, in 21 cities of four States of the United States of America, in relation to the fluorine content of the public water supply. The results are typical of those obtained by Dean and his co-workers in many epidemiological studies during the last few years. In three cities where the fluorine content of the water supply ranged from 1·8 to 2·6 parts per million, the number of permanent teeth affected by dental caries per 100 children examined ranged from 236 to 252. In five cities where the water supplies contained 0·9 to 1·3 parts per million of fluorine the number of teeth affected by dental caries ranged from 258 to 343 per 100 children, while the corresponding range for two cities with 0·5 and 0·6 part per million of fluorine in the drinking water was 412 to 444. Those cities whose public water supplies contained less than 0·5 part per million of fluorine were characterized by a high incidence of dental caries, and in eight cities with a water supply containing 0·2 part per million of fluorine the caries incidence ranged from 673 to 823 teeth per 100 children. Dean and his co-workers concluded that it was highly probable that the factor inhibiting caries was the fluorine content of the water supply. Epidemiological studies by Day (1940) in India and by Weaver (1944) in England confirmed the findings of Dean and his co-workers, while the work of Deatherage (1943) and Bull (1943) also supports their hypothesis.

The evidence obtained from epidemiological surveys is also supported by chemical analyses of teeth and by animal experimentation. Armstrong and Brekhus (1938) found that the enamel of carious teeth contained less fluorine than that of sound teeth obtained from the same person. Also, the enamel of the teeth of persons suffering from rampant caries was found to contain much less fluorine than the average amount found in the enamel of

sound teeth. Their findings were confirmed by Sognnaes and Armstrong (1941).

Animal experimentation has provided yet another strong line of evidence in support of the fluorine-caries-resistance hypothesis. There is much evidence indicating that extra fluorine, in a variety of dosages and states of combination, reduces the incidence of caries in the molar teeth of rats fed on a caries-producing diet. Cox *et alii* (1939) and Norvold and Armstrong (1943) found that the addition of fluorine to the diet of rats during pregnancy and lactation brought about an increased resistance to caries in the teeth of the offspring. McClure (1943) and Norvold and Armstrong observed that the feeding of extra fluorine for a period preceding the caries regimen reduced the subsequent susceptibility to caries. Finally, Miller (1938), Hodge and Finn (1939), McClure (1941), and McClure and Arnold (1941) found that rats maintained on a caries-producing diet experienced a pronounced reduction in the incidence and severity of dental lesions when the diet was supplemented with fluorine supplied in either the food or the drinking water.

Yet another line of investigation has been developed recently, since Sognnaes (1941) found that topical applications of aqueous fluoride solutions to the teeth of rats inhibited the development of caries. Cheyne (1942), Knutson and Armstrong (1943), and Bibby (1944) confirmed this finding with children, reducing the incidence of caries by as much as 50%.

The evidence obtained from epidemiological surveys, chemical analyses, animal experimentation and the more recent studies of the effects of topical applications of fluorides would seem to make a strong case in favour of the beneficial role of fluorine in the prevention of dental decay. Many workers regard the concordant evidence from these different approaches, with no adverse data, as sufficient proof of the value of fluorine in the prevention of dental caries. Many have recommended, as a means of reducing the incidence of dental caries, the addition of fluorine to water supplies with a low content of this element, in sufficient quantity to bring the concentration up to one part per million. The results obtained by the use of topical applications of sodium fluoride or other fluorides to teeth are striking enough to suggest that this procedure seems very likely to be adopted as a preventive measure against caries on a fairly wide scale, and several workers favour it rather than the addition of fluorine to water supplies.

The extensive literature dealing with the mechanism of the action of fluorine and with other related problems has been reviewed in detail by many workers. The general problem of fluorine and its relation to chronic endemic dental fluorosis and to dental caries has been reviewed in a symposium published by the American Association for the Advancement of Science (1942) and by Dean (1940). The caries-fluorine hypothesis has received most attention in recent years, and among the many reviews those of Volker and Bibby (1941), Arnold (1943), Ast (1943) and Bibby (1944) may be mentioned.

In Australia only two towns where dental fluorosis is endemic have been reported. Clements (1937) observed endemic fluorosis in two towns in Queensland—namely, Julia Creek and Thargomindah—where the amounts of fluorine in the water were 3·0 and 1·6 parts per million respectively. Fluorosis was confined entirely to children born in the district or entering it at the age of three years or less and drinking water from artesian bores; no cases were observed among children receiving surface water. Of 62 children, aged seven years and over, born in the towns and drinking bore water, 55 were found to be suffering from some degree of dental fluorosis.

The distribution of fluorine in water supplies in this country has not been reported, and so far as is known, no studies have been made of the distribution in relation to the incidence of caries.

The analyses of the water supplies for fluorine reported in this paper were carried out by one of us (R.L.R.) as incidental to a study of the factors contributing to abnormal dentition in young sheep. Most of the analyses are of waters from New South Wales, but a few were made of Tasmanian waters, and the results are included in the survey.

The Fluorine Content of New South Wales and Tasmanian Water Supplies.

Analytical Methods.

The methods of analysis used were those of Sanchis (1934) and Scott (1941). However, direct colorimetric determinations were not possible on many samples because of the presence of slight natural off-tints in the waters. In others, high concentrations of interfering ions, the presence of colloidal material and the use of chemicals, such as lime for softening and ferric alum for flocculating suspended matter, prevented the use of direct methods. Accordingly, in the majority of samples the fluorine was isolated from interfering substances as hydrofluoric acid by the steam distillation procedure of Sanchis (1936) and determined colorimetrically in the distillate by the method of Sanchis or Scott.

The chloride and sulphate contents of the waters were low, in most cases only a trace of either being present. None of these waters had a sulphate content of more than 50 parts per million, and only five contained more than 50 parts per million of chloride, the highest being of the order of 350 parts per million.

Preliminary investigations into Sanchis's method revealed that allowing the sample to stand overnight for the colour to develop without previous boiling yielded the same results as boiling and allowing the sample to stand for four hours before reading the result. This agrees with the finding of Raghavachari and Venkataramanan (1940). The method of Scott gave the same results as that of Sanchis and was found to be more rapid and convenient in handling large numbers of samples. For this reason it was found preferable and most of the analyses were carried out by this method.

Results.

The results of the analyses of 93 samples of water, together with their sources, are recorded in Table I.

The analyses revealed that none of the surface waters analysed had a fluorine content greater than 0·4 part per million and that the majority contained 0·2 part per million or less. The artesian and other ground waters, however, had a higher fluorine content, the highest being the sample from Gulgong with one part per million. This supply comes from a deep lead into Tertiary gravels.

The analysis of one sample of rain water from a galvanized iron tank is included at the end of the table.

No fluorine was detected in five of the six Tasmanian samples.

Discussion.

The New South Wales waters analysed are representative of the common water supplies of a population of 2,082,000 out of a total State population of 2,790,000. This figure does not include the large rural population, who, because the high mineral content of most shallow ground waters makes them unsuitable for human consumption, use rain water for domestic purposes. Their fluorine intake from this source could be expected to be negligible. Also, the figure excludes a population of more than 90,000 in nearly 70 towns whose water supplies are indirectly covered by this survey by reason of their being drawn from sources already analysed in the present series. It seems probable that, directly or indirectly, at least 85% of the total State population is covered by the present survey.

Of a total Tasmanian population of 240,000, more than 112,000 reside in the six towns whose water supplies are included in the present series.

It should be noted that in several smaller towns in New South Wales, particularly those drawing their water supplies from artesian bores—for example, Walgett—many residents rely on rain water from galvanized iron tanks for household use. This factor is also of importance in some larger towns—for example, Parkes. In addition, the number of towns and villages served by artesian and sub-artesian supplies is small and their populations are also

TABLE I.

The Fluorine Content of Potable Waters in New South Wales and Tasmania.

Town.	Population.	Source of Supply of Sample.	Date of Collection.	Fluorine Content. (P.p.m.)
Adelong	819	Adelong Creek.	13/3/45	0·2
Albury	11,720	Murray River.	19/2/45	0·1
Armidale	7,020	Dumaresq Creek and Puddledock Creek.	27/3/45	0·15
Barraba	1,490	Connors Creek.	14/2/45	0·15
Bega	2,570	Bega River.	26/2/45	0·2
Bingara	1,440	Gwydir River.	20/2/45	0·1
Blackheath	1,610	Adams' Creek.	24/2/45	0
Burnie (Tasmania)	3,390	Emu River.	15/3/45	0
Canberra	8,050	Cotter River.	7/3/45	0·1
Casino	6,260	Richmond River.	27/2/45	0·1
Condobolin	2,760	Goobang Creek.	12/3/45	0·1
Cooma	2,150	Murrumbidgee River.	23/2/45	0·15
Coonamble	2,870	Artesian.	15/3/45	0·35
Cootamundra	5,520	Murrumbidgee River.	21/2/45	0·05
Cowra	5,540	Lachlan River.	22/2/45	0·15
Culcairn	1,169	Billabong Creek alluvium.	26/3/45	0·3
Deniliquin	3,390	Edwards River.	28/2/45	0·15
Devonport (Tasmania)	5,150	Forth River.	15/3/45	0
Dungog	2,200	Williams River.	20/2/45	0·1
Enngonia	40	Artesian.	20/3/45	0·5
Forbes	5,820	Lachlan River.	27/2/45	0·2
Ford's Bridge	27	Artesian.	22/3/45	0·7
Glen Innes	5,520	Beardy River.	1/3/45	0·1
Goodooga	160	Artesian.	26/3/45	0·55
Gosford	3,880	Mooney Mooney Creek.	12/3/45	0·05
Goulburn	15,440	Wollondilly River.	19/3/45	0·3
		Sooley Creek.	19/3/45	0·3
Grafton	10,530	Nymboida River.	16/2/45	0·1
Grenfell	2,630	Bogalong Creek (from springs in acid granite).	20/3/45	0·7
Griffith	4,150	Main Northern Irrigation Canal—from Murrumbidgee River.	15/3/45	0·2
Gulargambone	460	Subartesian.	30/4/45	0·6
Gulgong	1,820	Subartesian.	21/2/45	1·0
Gunnedah	4,180	Namoi River alluvium.	28/2/45	0·2
Hobart (Tasmania)	67,900	Mount Wellington and Lake Fenton.	14/3/45	0
Junee	4,360	Murrumbidgee River.	21/2/45	0·1
Katoomba	7,440	Cascade Creek.	12/4/45	0·05
		Greaves Creek.	12/4/45	0·1
Kempsey	5,470	Macleay River.	26/3/45	0·1
Kiama	2,500	Fountaindale Creek.	20/2/45	0·1
Launceston (Tasmania)	32,830	St. Patrick's River.	15/3/45	0
Lawson	622	Woodford Creek.	14/3/45	0·1
Lismore	13,390	Wilson's Creek.	27/2/45	0·1
Lithgow	18,850	Farmer's Creek.	12/3/45	0·1
		Middle River.	12/3/45	0·1
Moree	4,920	Subartesian (Drummond Street bore).	28/2/45	0·1
		Subartesian (Oak Street bore).	28/2/45	0·1
		Mehi River alluvium.	28/2/45	0·1
Mudgee	4,180	Redbank Creek.	21/2/45	0·25
		Cudgegong Creek alluvium.	21/2/45	0·1
Murwillumbah	4,640	Tweed River.	6/3/45	0·1
		Kurrumbin Creek.	6/3/45	0·1
Narrandera	4,430	Murrumbidgee River.	23/2/45	0·1
Narromine	1,730	Macquarie River.	3/3/45	0·2
Newcastle—				
Metropolis	123,580	Chichester River.	5/3/45	0·1
Eight shires and municipalities outside metropolis	94,632	Tomago sand beds.	5/3/45	0·1
Nowra	3,250	Good Dog Creek.	19/2/45	0·1
		Good Dog Creek—filtered.	19/2/45	0·1
		Flat Rock Creek.	19/2/45	0·1
		Flat Rock Creek,—filtered.	19/2/45	0·1
Nyngan	1,630	Bogan River.	20/2/45	0·2
Orange	10,440	Spring Creek.	2/3/45	0·1
		Spring Creek—filtered.	2/3/45	0·1
		Meadow Creek.	2/3/45	0·1
Parkes	6,340	Bumberry Creek.	12/3/45	0·4
		Beargamil Creek.	12/3/45	0·2
		Lake Endeavour—before heavy rain.	12/3/45	0·2
		Lake Endeavour—after heavy rain.	12/3/45	0·2
Quambone	154	Artesian.	30/4/45	0·55
Scottsdale (Tasmania)	1,590	Forester River.	15/3/45	0
Singleton	3,840	Hunter River—untreated.	3/3/45	0·2
		Hunter River—softened.	3/3/45	0·1
Smithton (Tasmania)	1,290	Allen Creek.	15/3/45	0·1
Springwood	1,336	Woodford Creek.	14/3/45	0·05
Sydney—				
Metropolis	1,359,495	Tap water.	21/12/44	0
		Tap water.	17/1/45	0
		Tap water.	23/4/45	0·05
		Cataract River.	15/2/45	0
		Cordeaux River.	15/2/45	0
22 shires and municipalities outside metropolis	237,152	Avon River.	15/2/45	0
		Nepean River.	15/2/45	0·05
		Warragamba River.	15/2/45	0·2
		Prospect Reservoir.	15/2/45	0·05
Tamworth	11,130	Peel River alluvium.	23/2/45	0·2
Taree	5,190	Dingo Creek.	20/2/45	0·1
Temora	4,340	Murrumbidgee River.	20/2/45	0·1
Tenterfield	2,720	Tenterfield Creek.	27/2/45	0·15
Trangie	931	Subartesian.	5/4/45	0·5
Tumut	2,176	Tumut River.	13/3/45	0·1
Wagga Wagga	13,330	Murrumbidgee River.	5/3/45	0·15
Walgett	1,106	Artesian.	3/3/45	0·6
Wellington	4,540	Macquarie River.	24/2/45	0·2
Wentworth	870	Murray River.	23/2/45	0·25
		Rain water—from galvanized iron tank at Blackheath.	15/3/45	0·05

small, so that it is evident that waters with a significant fluorine content are used exclusively for domestic purposes by only a very small proportion of the population of New South Wales. All the large towns obtain their water supplies from surface sources which invariably contain almost negligible amounts of fluorine.

It is possible that the fluorine content of the waters analysed fluctuates, but many samples were drawn from rivers at the end of a drought period, when river levels were low and the fluorine content could be expected to be at a maximum. Presumably, then, the fluorine content could be lower in normal seasons or at other times of the year; but the figures obtained are so low that any difference would be insignificant.

The possibility of the existence in this State of areas where mottled enamel is endemic seems remote. The occurrence of the condition even in mild degree is probably rare, as the highest level of fluorine observed, with one exception, was only 0·7 part per million, which is still well below the critical level of one part per million. The exception is Gulgong, and it would not be surprising to find isolated cases of mild fluorosis among children raised in the town and using the town water supply exclusively. Other isolated cases might be found in families using for domestic purposes artesian or other ground waters of sufficiently high fluorine content.

The beneficial effect on the incidence of dental caries of fluorine present to the extent of more than 0·5 part per million seems to be well established; but the significance of amounts of 0·2 part per million or less seems to be in doubt. Dean, Arnold and Elvove found an excellent inverse correlation between caries incidence and the fluorine content of the water supply down to a level of 0·3 part per million, but in the range of 0·2 to 0 part per million of fluorine there was no correlation. These workers considered that no discussion of the variation observed at these lowest levels was justified, in view of the lack of information regarding the effect of low levels of fluorine on dental caries incidence. Nevertheless, it is well established that in general the caries incidence is highest in communities where the common water supply contains such low levels of fluorine. It seems, therefore, that in this State and probably also in Tasmania it is unlikely that the dental caries incidence is influenced beneficially to any significant extent by the small amounts of fluorine in the common water supplies of the great majority of the population.

In view of the high incidence of dental caries in this country, further research into the problems of the relation of fluorine to dental development under Australian conditions would be of value, although investigations designed to correlate the caries incidence with the fluorine status of the drinking water in various localities might be difficult. Few towns have water supplies containing more than 0·5 part per million of fluorine, and their population may use rain water for domestic purposes. Some town supplies are often inadequate, and water then has to be brought from other districts. Of the towns dealt with in the present investigation, Gulgong, and perhaps Trangie, are probably the only ones in the group with water supplies containing more than 0·5 part per million of fluorine where an investigation to correlate the incidence of caries with the fluorine content of the water supply would be possible on a reasonable scale. Again, as the present series of analyses includes only single analyses of water from each town, further determinations would first have to be made to reveal any variations in the level of fluorine in these waters.

Summary.

The fluorine contents of 93 samples of potable waters have been determined. These represent the common water supplies of at least 85% of the population of New South Wales and nearly 50% of that of Tasmania.

Of the total, 80 are surface waters and 74 of these have a fluorine content of 0·2 part per million or less. Of the 13 ground waters, nine contain fluorine to the extent of 0·5 part per million or more, the highest level observed being 1·0 part per million.

The significance of these results is discussed in relation to chronic endemic dental fluorosis (mottled enamel) and dental caries.

Acknowledgements.

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Reports of Cases.

AN ACQUIRED HÆMORRHAGIC DISEASE IN A FEMALE DUE TO AN INHIBITOR OF BLOOD COAGULATION.

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Clinical Record.

MRS. B., a married woman, aged thirty-nine years, had been suffering for nine years from hæmorrhages into the joints and subcutaneous tissues in almost all parts of the body. Hæmorrhage followed the slightest trauma and often occurred without any knowledge of trauma. At times slight exercise would provoke a hæmorrhage, and on one occasion friction by a dental plate caused a hæmorrhage at the base of the tongue. The patient had to discontinue playing the violin because it caused hæmorrhages into the wrist joint. Hæmorrhages appeared in large visible patches, and according to their size retrogressed in periods varying from a few days to several weeks. Fifteen years ago an ovarian cyst was removed; but the patient showed no hæmorrhagic tendency till her thirtieth year, when she gave birth to a boy. Throughout pregnancy the patient suffered from severe vomiting attacks; three months prior to delivery eight teeth were extracted, and practically no hæmorrhage followed. Four months after delivery the patient had the first hæmorrhagic attack, and according to her description, "the leg seemed to hop out of the socket in the hip. Pain was very severe and the hip swelled very much". From then on severe hæmorrhages occurred in various parts of her body. She was treated by intramuscular injections of a commercial thromboplastin preparation; this, however, produced an additional hæmorrhage. Ten months after delivery a severe hæmorrhage in the ovary was diagnosed. A series of intramuscular injections of œstrogens was given, but a hæmorrhage affecting an area "as large as a dinner plate" occurred at the site of the third injection. As far as the patient is aware, no hæmorrhagic tendencies have been observed in her ancestors during three generations, and no intermarriage has occurred. Both parents are alive. Mrs. B. is the fifth of six children, four males and two females; none of these showed any hæmorrhagic tendencies. All except one brother are alive, and he died from sarcoma. Her child is now nine years of age and shows no hæmorrhagic tendency; at the age of four a tonsillectomy was performed and no undue hæmorrhage occurred. No prophylactic treatment was given.

A medical examination of the patient, carried out by Dr. S. O. Cowen, revealed no abnormalities. A blood examination carried out at the Royal Melbourne Hospital on July 30, 1936, revealed normal values for hæmoglobin level, erythrocytes, colour index and leucocytes. The differential leucocyte count revealed a slight relative leucocytosis and a "shift to the left" in the granular series. The number of platelets was 600,000 per cubic millimetre; the bleeding time estimated by the Duke technique was three minutes twenty seconds, the normal figure being two to five minutes. The coagulation time of whole blood estimated by the capillary method of Peterson and Mills was twelve minutes (normal figure two to four minutes), and the calcium concentration in the serum was 11 milligrammes *per centum*. From these values it is apparent that, with the exception of a prolonged coagulation time of whole blood, the results of chemical and cytological examinations were normal. A diagnosis of pseudohæmophilia was made.[1]

On August 2, 1945, the patient was referred to the Baker Medical Research Institute. At the time she was recovering from two hæmorrhages, one in the ankle, which impeded walking, and one on the back of the head. The former was contracted from a fall, but no history of any head injury could be elicited.

Investigations.

On several occasions blood tests were carried out. The results are given in Table I.

For estimation of prothrombin activity the Quick[(1)] technique was employed, using 6% rabbit or human brain extract and 0·01 molar calcium chloride solution. For the whole blood coagulation time the Lee-White[(2)] technique, using two millilitres of venous blood, was employed. For estimation of the plasma coagulation time, to 0·1 millilitre of oxalated plasma was added 0·1 millilitre of 0·025 molar calcium chloride solution at 37·5° C. Fibrinogen estimations were carried out both by (*a*) recalcification of dilute oxalated plasma and (*b*) the addition of thrombin.

In addition, the Wassermann test failed to produce a reaction, the patient's blood was Rh-positive, and the tourniquet test always gave negative results. Skin bleeding time, estimated by the technique of Copley and Lalich,[(3)] was normal. Blood for examination was obtained by venepuncture, and prompt application of a tight bandage prevented oozing from the wound except on one occasion, when Russell viper venom ("Stypven") had to be applied after the puncture had oozed for twenty-four hours. On the other hand, no difficulty ever followed pricking of the

[1] Working with a full-time grant from the National Health and Medical Research Council.

[1] The case has been reported by T. J. F. Frank, in *Royal Melbourne Hospital Clinical Reports*, Volume VII, December, 1936, page 102.

finger. A cytological examination was carried out by Dr. A. R. Gilchrist, assistant pathologist at the Alfred Hospital, on March 7, 1946, with the following results. The hæmoglobin value was 13 grammes *per centum* (normal, 14·5 grammes *per centum*), red blood corpuscles numbered 3,700,000 per cubic millimetre, white blood corpuscles numbered 8,500 per cubic millimetre, platelets (Fornio's method) numbered 330,000 per cubic millimetre, and the differential leucocyte count gave essentially normal findings.

According to the results given in Table I, and the results of the cytological examinations, all the components for blood coagulation are at least potentially present in adequate amounts in the patient's blood, and yet the prolonged coagulation time suggests that the hæmorrhagic tendency is due to intravascular causes. The possibility that inhibitors of the heparin type might be present was disproved by the results shown in Table II.

TABLE I.

	Date of Test.			Normal Figure.
	August 2, 1945.	September 13, 1945.	March 7, 1946.	
Prothrombin activity ..	More than 100%	More than 100%	More than 100%	100%
Whole blood coagulation time (seconds) ..	1,550 to 2,220	1,500 to 1,860	900 to 1,020	160 to 260
Plasma coagulation time (seconds)	390 to 420	1,080 to 1,380	770	110 to 170
Fibrinogen content	(*a*) 247 milligrammes *per centum* (*b*) 305 milligrammes *per centum*	—	(*a*) 233 milligrammes *per centum* (*b*) 249 milligrammes *per centum*	190 to 380

TABLE II.

Coagulation Times.		Thrombin Dilution.
Normal Oxalated Plasma. (Seconds.)	Patient's Oxalated Plasma. (Seconds.)	
18·5	18·5	1/10
85·0	86·0	1/30
126·0	130·0	1/40

The tests were carried out in the following way. To 0·2 millilitre of oxalated plasma was added 0·1 millilitre of a bovine thrombin preparation (Parke, Davis and Company) in increasing dilutions. Clotting times were measured at 37·5° C. Human thrombin gave similar results. In control tests using 0·02 unit of heparin per millilitre of normal plasma, pronounced differences in clotting time were obtained. Since the results recorded above are within experimental error identical, the prolongation cannot be due to abnormal amounts of heparin in this patient's blood.

In order to show whether the delayed coagulation was due to lack of thromboplastin, coagulation experiments were carried out with homologous thromboplastin as well as that of rabbits. Both were prepared from dehydrated brain according to the technique of Quick.[1] By the use of heterologous brain extracts no differences could be observed between normal and patient's blood even in high dilutions (Figure I, curve R); but by the use of very dilute homologous brain extract in concentrations lower than 0·006% significant differences were obtained (Figure I, curve H°). Further, when the plasma was incubated with homologous brain extract, the differences between normal and the patient's coagulation time became even more pronounced (Figure I, curve H'). From these results we conclude that there is no lack of thromboplastin, but that the homologous thromboplastin is inhibited by a specific antithromboplastic factor.

Curve R in Figure I represents results of experiments in which rabbit brain was used and clotting times were measured immediately after addition of the components. In the curve H° in Figure I coagulation times were

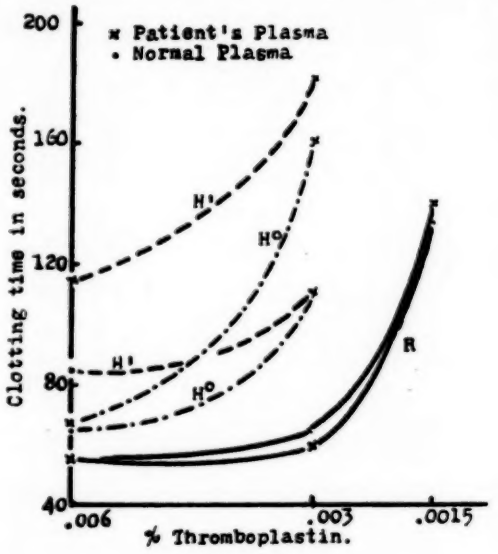

FIGURE I.

Influence of homologous and heterologous thromboplastin on plasma coagulation time. To 0·1 millilitre of oxalated plasma was added a mixture of 0·1 millilitre of thromboplastin suspension of varying strengths and 0·1 millilitre of a 0·01 molar calcium chloride solution. Reaction temperature was 37·5° C.

measured immediately after addition of human brain extract and calcium chloride, while curve H' in Figure I indicates the results obtained when plasma and human brain extract were incubated for ten minutes at 37·5° C. prior to recalcification. For comparison, coagulation studies have been carried out on plasma from a male hæmophiliac who had a whole blood coagulation time of 7,200 seconds, a plasma coagulation time of 2,400 seconds and a fibrinogen concentration of 270 milligrammes *per centum*. When the experimental conditions are applied as described in curve R, Figure I, the results shown in Table III were obtained.

TABLE III.

Concentration of Rabbit Brain Extract.	Hæmophilic Plasma Coagulation Time. (Seconds.)	Normal Plasma Coagulation Time. (Seconds.)
6·0%	13	13
0·06%	34	34
0·01%	113	78
0·006%	163	82

From the results obtained, it is evident that by the use of 6% brain extract a normal prothrombin activity was indicated, but the coagulation times when lower concentrations were used in the case of true hæmophilia are in pronounced contrast to those shown in curve R of Figure I.

Corroborative evidence for the presence of an inhibitor of blood coagulation in the patient's plasma was obtained by the following tests. When mixtures of equal volumes of the patient's oxalated plasma and of prothrombin-free

plasma[1] from normal persons were recalcified, coagulation times as set out in Table IV were observed. Coagulation times were measured at 37·5° C., 0·1 millilitre of plasma having been mixed with 0·1 millilitre of 0·025 molar calcium chloride solution.

TABLE IV.

	Treatment of Plasma.	Coagulation Time of Recalcified Plasma. (Seconds.)		Normal Figures. (Seconds.)
		September 13, 1945.	March 7, 1946.	
Plasma ..	100%	1,230	770	105 to 170
	Diluted 1 : 1 with sodium chloride solution	1,350	890	130 to 300
Normal plasma *plus* patient's prothrombin-free plasma.	Before incubation ..	330	222	155 to 220
	After incubation ..	570	340	—
Normal prothrombin-free plasma *plus* patient's plasma.	Before incubation ..	720	375	155 to 220
	After incubation ..	1,200	500	—

After incubation of these mixtures a distinct prolongation of coagulation time was found. Again, alumina plasma prepared from the patient's blood was able to inhibit the coagulation of normal plasma. These last-mentioned results, however, were less pronounced, probably because alumina gel removed portion of the inhibitor as well as prothrombin.

Discussion.

The clinical symptoms and the experimental evidence suggest that the patient under discussion acquired the hæmorrhagic tendency several months after childbirth. The prolonged coagulation time of whole blood as well as the delayed coagulation time of the recalcified plasma indicates that the hæmorrhagic tendency is due to intravascular causes. There is experimental evidence that apart from heparin, blood as well as organs contain another type of coagulation inhibitor. It has been found by Chargaff[5] and later by DeSütö-Nagy[6] that organs contain, in addition to the clot-accelerating thromboplastin, coagulation-delaying substances, and Trethewie[7] has indicated the presence of coagulation inhibitors following perfusion of organs. Tocantins[8][9] believes that true hæmophilia is due to an excess of inhibitors in the blood, which can be shown by incubation of plasma with a homologous thromboplastin preparation.

Without entering into the controversy, whether in true hæmophilia there is a lack of soluble thromboplastin according to Patek and Taylor,[10][11] or whether, as Tocantins assumes, this condition is due to the excessive increase of anti-thromboplastins in plasma, we should like to point out that by using homologous as well as heterologous thromboplastin this question may be answered. It is known that thromboplastins isolated from mammalian tissues have the ability to convert prothrombin to thrombin. Hence for the estimation of prothrombin, any type of thromboplastin can be used. On the other hand, it has been pointed out (Fantl[12]) that homologous brain extracts show greater potency with human plasma than does heterologous thromboplastin. In addition, Tocantins found that antithromboplastin has also a certain species specificity, the greatest inhibiting effect being observed when human thromboplastin is incubated with homologous plasma. It thus appears that in order to find out whether plasma is deficient in thromboplastin, it is sufficient to carry out coagulation tests with heterologous thromboplastin in decreasing concentrations. When such a test was carried out in the case under discussion, no difference at any concentration of rabbit's brain was found between her plasma and that from a normal subject. This is in contrast to what is found in true hæmophilia. The latter observation has already been recorded by Dam and Venndt,[13] who found that heparinized plasma of hæmophiliacs shows reduced coagulation ability on the addition of decreasing quantities of tissue extract.

The rarity of hæmorrhagic tendencies in adult females without any recognizable pathological condition justifies a comparison of the case described with those investigated by previous workers.

Joules and MacFarlane[14] present the case of an elderly woman, who was well until her fifty-sixth year, when she developed a tendency to hæmorrhage. Coagulation of whole blood was much delayed, but there was no quantitative change in the number of platelets or in the prothrombin, fibrinogen and calcium contents of the blood. No cause for the hæmorrhagic tendency other than defective blood coagulation could be established, and in the opinion of these investigators the case resembled hæmophilia more closely than any other hæmorrhagic condition.

Madison and Quick[15] report a female "bleeder", who at the age of twenty-nine years noted for the first time extensive and painful ecchymosis. She had had three normal pregnancies without unusual hæmorrhage. Physical examination gave entirely negative results, except for swellings of variable size in the ecchymotic areas. The patient died from complete respiratory obstruction following a spontaneous hæmorrhage at the base of the tongue and in the mucosa of the larynx. Post-mortem findings were completely negative, except for extensive hæmorrhagic infiltration of the sublingual, submaxillary and laryngeal areas, and slight tubular degeneration of the kidneys. The laboratory findings were essentially those of hæmophilia, although in this case a positive result to the tourniquet test was obtained on several occasions. However, the authors consider that the coagulation defect appears to be the primary factor for the hæmorrhagic tendency, and propose the term "hæmophiloid" for similar conditions. It is interesting to note that in this case and in another mentioned by these authors, as well as in ours, the onset of the hæmorrhagic condition occurred in women aged about thirty years, and within a year after the birth of a child.

The only case reported in the literature which in laboratory findings at least showed some similarity to our case was reported by Lozner, Joliffe and Taylor;[16] it concerns a male "bleeder", whose blood findings closely resembled those found in true hæmophilia. The coagulation time of whole blood was considerably delayed. These authors were able to show that an anticoagulant was present in the circulation. An addition of 5% to 10% of the patient's plasma to normal blood caused considerable delay in coagulation.

Summary.

The case is presented of a woman who acquired a hæmorrhagic diathesis four months after the birth of a child, without any detectable pathological lesion. The condition is due to prolonged coagulation time of whole blood and plasma. This was shown to be due to a specific antithromboplastic factor.

Acknowledgements.

Appreciation is expressed to Dr. J. McLean and to the staff of the blood bank, Alfred Hospital, Melbourne, for their cooperation in collecting blood specimens.

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REPORT OF A CASE OF OSTEOGENIC FIBROMA OF THE SKULL.

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H.P., a male patient, was admitted to a military hospital on July 27, 1945, complaining of pain and deafness in the right ear with slight discharge. The pain had been present for five days and was growing worse. He had noticed a swelling of the right side of his head over fifteen years earlier; he thought it had been growing gradually bigger, but he was rather vague about it. Fourteen years earlier a doctor had advised him to leave it alone. Deafness had begun about five years before examination, when he had a slight discharge from the right ear, which lasted for only a few days. The deafness had been increasing, and had grown much worse since the pain began. He had never had any pain before the present attack.

On examination, the right external auditory meatus was found completely blocked by a swelling in the antero-superior aspect; the swelling appeared to be firm at the base, but slightly mobile at the tip. A small probe could be inserted past it into the meatus for about a quarter of an inch. At the tip of the swelling there was an opening through which a probe could also be passed for about half an inch; the probe then came up against bone. The skin over the swelling was hyperæmic and bled freely when touched. There was a swelling of the right side of the head, which had the shape of a slightly flattened dome, protruding three-quarters of an inch beyond the normal skull contour, and covering a roughly circular area of three and a half inches' diameter above and slightly behind the right ear. The pinna was displaced forward and downward, and there was a small finger-like prolongation into the root of the zygoma. The surface was smooth, and the skin moved freely over it. The consistency was bony hard, and no impression could be made on it by palpation. There was a tender spot over the mastoid, and movement of the pinna was painful.

On July 29 pathological examination of a swabbing from the right ear revealed a moderate growth of pure hæmolytic *Staphylococcus aureus*. On July 30 an X-ray examination revealed that both mastoids were cellular; there was some loss of translucency on the right side, but the cell outlines were still visible, and there was no evidence of pus or fluid in the sphenoids. At a further X-ray examination on August 10 the appearances suggested a benign tumour, almost certainly of the giant cell type.

The patient was treated with sulphamerazine (course B) from July 29, and with penicillin drops (500 units per millilitre) from August 3 to August 18, with considerable improvement in the inflammatory condition of the external meatus. On August 3, under general anæsthesia, a large piece of tissue was removed, which appeared to be attached to the meatal wall in the antero-superior aspect. Examination of the specimen revealed that the piece of tissue was bounded by hypertrophic epidermis; chronic inflammatory fibrosis had occurred in the dermal layers.

On August 18, under general anæsthesia, exploration of the swelling on the right side of the head was undertaken. The incision was begun half-way down the posterior border of the right ear and half an inch behind it, and continued upwards and forwards, following the curve of the ear and keeping the same distance from it until the root of the zygoma was reached, and then it was carried one inch straight forward along the zygoma. The temporal muscle was split and retracted in both directions, and the periosteum was elevated. A bony swelling was then outlined, which had well-defined edges in the upper and posterior aspect, but blended forwards and downwards with the zygoma, the temporo-mandibular joint and the external bony meatus. The bone over this swelling was thin and yielding, and was removed down to the upper and posterior margin and as far forward and downward as was possible with safety. A large, firm tumour was then outlined, which was elevated reasonably easily from behind and above, but was found to have areas of firm attachment to the underlying structures. It was found easier to remove it piecemeal. When all the tumour was removed, it was found that an area of dura of the middle fossa, two inches long and one inch broad, had been exposed. The tumour had eroded into the middle ear cleft, into the soft external meatus, and right forward into the root of the zygoma. An area of the lower aspect of the exposed dura bled freely when separated, otherwise hæmorrhage was moderate. The brain tissue had been considerably compressed and displaced nearly to the midline in places, but the dura appeared intact and the convolutions undamaged. Two "B.I.P.P." gauze packs one inch wide and twelve inches long were put in the cavity, and a small pack was put into the external meatus. The wound was sutured except in the posterior aspect, where the ends of the "B.I.P.P." gauze packs were left protruding. Wound healing was slow but uneventful, and was accompanied by a gradual retraction of the tissue over the tumour area until eventually a slight depression was left.

On September 6 the pathological report on the tumour removed at operation was received. The specimen consisted in the greatest part of fibrous tissue, in which ill-formed bone fragments were present, in association in some areas with both osteoblastic and osteoclastic activity. The tumour was vascular, and many vessels had merely endothelial lining. Altered blood pigment was scattered here and there. It was held to be a benign osteogenic tumour, an osteogenic fibroma, possibly arising from the outer periosteal layer of the temporal bone.

On the advice of Major H. Ham, a course of deep X-ray therapy was then undergone every second day for a period of two weeks. The inflammatory condition of the external meatus gradually subsided, and at the present time complete epithelialization of the whole canal has occurred. The retraction of the scar tissue has caused a slight elevation of the medial aspect of the external canal, and there has been a slight sagging of the lateral portion. The result is that the upper and lower external meatal walls meet about half-way along its length. It is likely that a plastic operation will be required to lift up the lateral portion.

SERIOUS INFECTIONS OF THE HAND AND PENICILLIN.

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RECENT reports on the management of infections of the hand, with special reference to suppurative tenosynovitis of the flexer tendon sheaths of the fingers,[1][2] prompt me to record and discuss the clinical histories of patients with the more serious infections of the hand treated by me during the last nine months.

The more serious infections of the hand, especially suppurative tenosynovitis, are fortunately rare, and the following report is of five cases: one case of subcutaneous infection of first phalanx, one case of web (commissural) space infection, two cases of uncomplicated suppurative tenosynovitis of flexor tendon sheaths, and one case of complicated suppurative tenosynovitis of flexor tendon sheaths. These cases have been gathered from amongst 3,000 prisoners of war in a prisoner-of-war camp over a period of nine months. These prisoners of war are engaged in numerous activities, such as wood-cutting, road-making, carpentry and the numerous everyday labours which render them liable to injuries to the fingers and hands—the usual commencement of infection of the hand.

Subcutaneous Infection of the First Phalanx.

CASE I.—A male patient, aged thirty-three years, was admitted to hospital with a subcutaneous infection of the first phalanx of the left thumb. He had sustained a blister in the area some five days previously while using a scythe. The infection resembled a carbuncle and was draining through a central orifice. He was given penicillin systemically, 15,000 units every three hours; the limb was splinted and elevated and heat was applied. Despite this, after forty-eight hours the infection was worse; œdema and redness were present over the base of the phalanx and towards the web. Under "Pentothal" anæsthesia and with a tourniquet in position the wound was probed and laid open to its full extent—that was into web; "Vaseline" gauze dressing was used, and post-operative treatment consisted of the continued systemic administration of penicillin, and splinting and elevation of the limb, with the application of heat. In five days the wound was dressed; no discharge was then present and healthy granulations had formed. Within one week more the wound was almost healed and the function of the thumb returned to normal.

Comment.

This case illustrates well the necessity of adequate surgical drainage as well as administration of penicillin. The infection continued to spread despite penicillin treatment until adequate drainage was established, after which healing occurred rapidly.

Web or Commissural Space Infection.

CASE II.—The patient was admitted to hospital with pronounced swelling and tenderness over the base of the first phalanx of the fourth finger on the left hand. There was no wound or site of injury, and the infection appeared to have risen beneath one of the numerous callosities on his hand. The hand was put at rest, elevated and subjected to dry heat by means of a table lamp, whilst sulphonamides were administered by mouth. In twenty-four hours the pain was worse; the swelling had increased and now covered the area between the third and fifth fingers, and the dorsum was also swollen. The administration of penicillin, 15,000 units every three hours by intramuscular injection, was commenced, and under general anæsthesia with use of tourniquet the fourth web space was slit from front to back and pus was evacuated. Pressure over the third web space caused further evacuation of pus, and a probe could easily be passed across in front of the tendon sheath to the third web space. This space, too, was slit, and adequate drainage was provided. The wounds were kept open with strips of "Vaseline" gauze and a dressing was applied. Rest, the application of dry heat, elevation of the limb and the intramuscular administration of penicillin were continued for another three days, when the dressing was changed. There was no further drainage, penicillin treatment was suspended, a light dry dressing was applied and movements of the fingers were encouraged. Both wounds were healed within another week, and normal function had returned.

Comment.

Here again penicillin treatment and adequate surgical drainage effected a rapid cure of the infection.

Suppurative Tenosynovitis of Flexor Tendon Sheaths.

The anatomical structure of the tendon sheaths (Figure I) demonstrates that the sheath presents three dilatations separated by two narrower portions. These latter are formed by strong fibrous flexor sheaths, which enclose the tendon and synovial sheath in front of the first and second phalanges; such fibrous flexor sheaths are absent over the metacarpo-phalangeal joint and the interphalangeal joints, and it is in these regions that the three dilatations or culs-de-sac occur. Thus, when the sheath is inflamed, pus collects, not in the space restricted by osteo-aponeurotic tunnels over the first and second phalanx, but in the dilatations towards the finger end over the second joint, especially over the metacarpo-phalangeal joint. These anatomical considerations caused Iselin to devise his method of drainage of tendon sheaths, the method used in the cases here described.

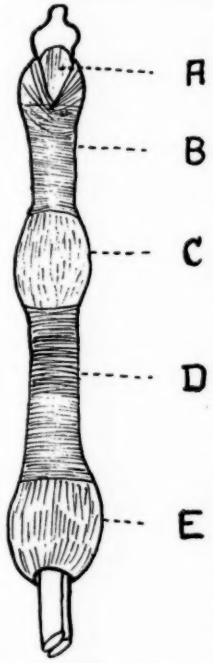

FIGURE I.

Showing three dilatations separated by narrower portions corresponding to fibrous flexor sheaths (after Iselin). A: distal cul-de-sac; B: distal fibrous flexor sheath; C: middle cul-de-sac; D: proximal fibrous flexor sheath; E: palmar cul-de-sac.

CASE III.—The patient was admitted to hospital with a history of having lacerated the middle finger of his left hand on a piece of tin some five days previously. He had not considered the injury important, and had done no more than wrap a piece of rag around it. He was in considerable pain, and his finger was swollen and immobile in a semi-flexed position, any attempt to flex or extend it causing severe pain. The point of maximum tenderness was over the base of the first phalanx. The sign recently described by Moses[3] was present—a sign which was demonstrated to me some four years ago by one of my teachers; there was a small, irregular, infected wound over the middle phalanx. The diagnosis of suppurative tenosynovitis was made, and the administration of penicillin, 15,000 units every three hours by intramuscular injection, was commenced. General anæsthesia was induced, a tourniquet was used and the original wound was carefully opened and excised; in its depth the involvement of the tendon sheath was confirmed. Then the four incisions of Iselin[4] were made as follows (Figure II): palmar incisions in the intermetacarpal spaces on each side of the infected finger from the first proximal to the web for about two centimetres, terminating about the level of an imaginary line running from the outer and distal end of the vertical palmar crease to the inner end of the distal palmar flexion crease. The aponeurosis was incised

and then retracted, the distended superior cul-de-sac being well exposed. This was incised longitudinally on each side, with the escape of a small amount of pus. Forceps were then inserted through each palmar wound, and a dorsal counter-incision was made against their points; a piece of rubber glove drain was pulled through each pair of incisions. Dry dressings were applied, and the hand was splinted and elevated. Penicillin treatment was continued for nine days, the dressing being changed and the

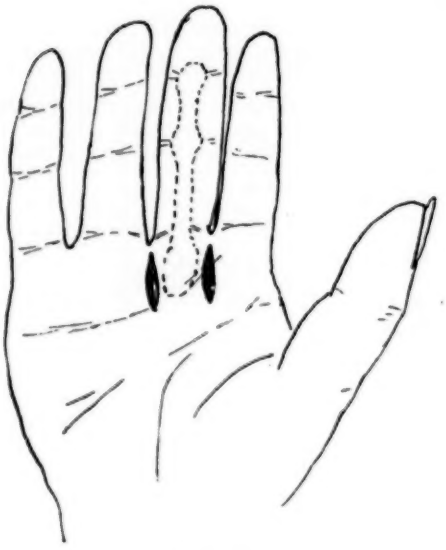

FIGURE II.

Showing site of incisions to open the superior cul-de-sac of flexor tendon sheath. Counter incisions are made on the dorsum opposite these incisions.

drains removed on the seventh day. The patient at this stage was free of pain and apyrexial, and movement of the finger was then commenced. The wounds were all healed by the sixteenth day, and the patient had almost complete use of the finger one month later.

CASE IV.—The patient was admitted to hospital having run a splinter into the volar surface of the first phalanx of the second finger of the right hand two days previously. The splinter was removed at that time and he gave no more thought to the injury till the next day, when the finger had become very painful. The clinical picture was similar to that in Case III—pain, swelling, immobile finger, maximum tenderness over the superior cul-de-sac. Penicillin treatment with 15,000 units given by intramuscular injection every three hours was commenced, and under general anæsthetic and with a tourniquet the original splinter wound was incised, the involvement of the sheath being confirmed. The drainage of the sheath was established as in Case III and a similar post-operative routine was followed. The infection, however, did not settle so quickly, and penicillin treatment was continued for eleven days, after which the wound ceased to drain and commenced to heal. Healing was complete in twenty-four days, and the patient had full use of his hand, although he was unable completely to flex the fingers two months later.

CASE V.—The patient was admitted to this hospital having sustained a crushing injury to his right hand twenty-four days previously. In that time his wound had been dressed and his hand radiologically examined, and he was told that he had sustained a fracture. His arm and hand were put into a plaster splint. Twenty-four days later he reached this hospital. His temperature was 100° F., and when the plaster was removed the following picture was revealed. The index finger was swollen and rigid, and a partly healed laceration was present over the volar surface of first and second phalanges. A small amount of pus exuded from a fistulous opening in the centre of the wound. He was not in a great amount of pain. The second finger was similarly swollen, and two healed lacerations were present over its volar surface with a fistulous opening, again draining a little pus, over the first interphalangeal joints; the whole finger was rigid, and there was some slight tenderness in the palm.

Penicillin treatment was commenced, 15,000 units being given every three hours by intramuscular injection, and the hand was splinted, elevated and subjected to dry heat.

It was thought that the cause of the persistent infection was probably sloughing of tendons, but a conservative attitude was adopted until twelve days later, when swelling and tenderness were noted in the region of the middle palmar space. X-ray examination at this time revealed advanced suppurative arthritis of the first interphalangeal joint of the second finger, and early arthritis of the corresponding joint of the first finger. It was considered that in view of the sloughing of the tendons and involvement of the joints, both these fingers would be useless, and as it now appeared that the infection had spread to the middle palmar space, amputation was an operation of necessity as well as of choice.

Under general anæsthesia and with a tourniquet both fingers were amputated. The insertion of artery forceps into the retro-tendinous middle palmar space revealed pus, and therefore to establish drainage the heads of both metacarpals were removed, the wound was kept opened with "Vaseline" gauze, and no attempt at suture was made. Penicillin treatment, elevation of the hand and the application of heat were continued. Five days later the gauze was removed and there was no further discharge. The wound was closed by secondary suture. Penicillin treatment was continued for a further three days and then discontinued. The wound healed without further complication.

Post-operative investigation of the amputated fingers revealed sloughing of tendons and destruction of the first interphalangeal joints in both cases.

Comment.

It is now an established fact that the treatment of infection caused by penicillin-susceptible organisms by adequate surgical drainage and systemic administration of penicillin, is rewarded by rapid healing and return to function, provided that the essential mechanism for function is not irreparably damaged, and this is true of infections of the hand as of infections elsewhere.

The cause of bad results with failure of return of function in serious infections of the hand, is either that owing to the infection some part of the essential mechanism is destroyed—for example, sloughing tendon or suppuration in a joint, or that owing to surgical intervention some essential structure is damaged. The most common example of this condition is seen in the many incisions which divide all the fibrous flexor sheaths and allow of prolapse of the tendon. With such incisions—for example, those of Biear, Klapp, Lexer, Zur Verth and even that of Kanavel—even if infection is overcome, the return to function is hindered by the interference with the intricate and essential mechanisms of the finger—that is, the fibrous tunnels which hold the tendon in its place of function. Thus in cases of suppurative tenosynovitis good results may be expected, provided that the diagnosis is made early, treatment with penicillin is instituted, and adequate drainage is established without damage to the essential structures of the finger. The method of drainage as described by Iselin is physiologically and anatomically sound and fulfills this latter requirement, and it was adequate in the two cases in this series in which it was used. The third case shows well the total inadequacy of penicillin treatment and surgery in attempting to restore function when the essential elements of function are destroyed and infection has spread to other sites.

Summary.

Five cases of serious infections of the hand are described. It is held that in this penicillin era serious infections of the hand should be followed by better return of function, provided the establishment of adequate drainage is ensured, and provided the essential elements of function are not damaged by surgery or infection. The method of Iselin is recommended in the treatment of suppurative tenosynovitis of flexor tendon sheaths.

Acknowledgement.

My thanks are due to the Director-General of Medical Services, Australian Military Forces, for permission to publish this paper.

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A LARGE MYOMA.

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Perth.

Clinical Record.

MRS. E., aged forty-nine years, consulted me on March 1, 1946, complaining of debility and increasing abdominal girth. The diagnosis of a large ovarian cyst appeared obvious when she entered the consulting room. Her menstrual history indicated regularity with decreasing loss. Never at any time had she had menorrhagia. Ten years earlier operation had been advised, but refused.

Examination disclosed enormous distension of the abdomen, the distension being due to a large, tense tumour of moderately hard consistency extending up from the pelvis and everting the lower costal margins. Pelvic examination gave no further information, although in retrospect I felt that the correct diagnosis might have been made because the uterine body could not be felt, and the tumour, although arising in the pelvis, did not fill it. The patient's general condition was fair, although the usual debility associated with large tumours was present. The diagnosis of a large ovarian cyst, made prior to examination, was retained.

At operation the tumour was found to be an excessively large myoma growing from the fundus of the small uterus. Adhesions were present between the uppermost margin of the tumour and the posterior part of the diaphragm and in the right renal pouch. Some troublesome hæmorrhage resulted from separation here, but was dealt with without undue difficulty. The performance of a subtotal hysterectomy was then simple, except for the weight and size of the tumour and large veins in the broad ligaments.

The intravenous administration of saline solution was commenced during operation, and subsequently a transfusion of one pint of blood was given. The post-operative course was entirely uneventful, and already the patient looks an entirely different person.

The weight of the tumour was twenty-six pounds, and it was found to be composed of muscle tissue throughout, rather soft towards the centre of the tumour, but without degeneration.

Comment.

Whilst one does not report this tumour as of a record size, its size in these enlightened days appears to warrant publication.

Reviews.

ANÆSTHESIA FOR THYREOIDECTOMY.

So far as it goes, Stanley Rowbotham's little book "Anæsthesia in Operations for Goitre" covers the ground admirably.[1] Consisting of exactly 100 pages, it is lavishly illustrated, and includes many photographs, which possibly accounts for the high quality of the paper used. This, in turn, may be responsible for the limitation in the size of the book, produced as it was under the war conditions of England.

At the outset the author emphasizes the necessity for a comprehensive knowledge by the anæsthetist of all the considerations involved in the treatment of goitre, both toxic and non-toxic. A refreshing anatomical review is followed by Joll's excellent classification of the diseases of the thyreoid gland. The statement, however, that the superior laryngeal nerve carries sensation from the posterior part of the dorsum of the tongue, while true enough, ignores the far greater importance of the glosso-pharyngeal nerve in this area. It is well known that the sensibility of the posterior and anterior aspects of the adjacent epiglottis varies greatly with the differing, if overlapping, distribution of these respective nerves. A discussion of the various abnormal conditions which affect the gland then follows, in the course of which the author makes interesting reference to the high incidence of chronic infections of the upper respiratory tract in exophthalmic goitre. But just how—or why—pus from an inflamed thyreoid gland may cause bronchopneumonia (page 10) is an obscurity which only the writer could elucidate.

The examination and preparation of the patient are fully dealt with. A brief final reference to the use of thiourea and thiouracil is included. Premedication is then discussed in most interesting fashion, several notable departures from common practice being described. The author recognizes the principle of multiple or combined procedures in prenarcosis and anæsthesia, whereby the advantages of several agents are utilized, while an attempt is made to reduce the deleterious effects of each. It is interesting to note, however, that he does not regard bromethol ("Avertin") favourably. Further, the clumsy "stealing" technique is advocated for some cases, whereas it is now generally appreciated that a single unadvertised injection of a barbiturate, such as "Pentothal Sodium", is a far more rational and less disturbing procedure. The description of the combination of chloral hydrate, "Omnopon" and hyoscine for prenarcosis in these cases is especially interesting.

Considerable space (21 pages) is devoted to the description and illustration of local analgesia for thyreoid surgery, covering both cervical plexus block and local infiltration, the latter being the preferred technique. Subject to the result of the Goetsch test, the author recommends the addition of adrenaline to the anæsthetic solution, a view which may not receive general approval, at any rate in toxic cases.

The section on general anæsthesia, while good, especially in its references to respiratory and other difficulties, is somewhat lacking in necessary detail. One striking feature, however, is the account of the author's ingenious transnasal laryngeal spray, which is used for the cocainization of the larynx before the performance of tracheal intubation. Otherwise this section deals inadequately with the various anæsthetic agents that might be employed, while any description of their actual administration and control is virtually absent. One is obliged to infer that the author's practice is invariably to use nitrous oxide and oxygen as a supplement to the prenarcosis and local analgesia already established. This implication is not in accordance with the requirements of cases in which large, obstructive, non-toxic goitres are present.

The author prefers a partial rebreathing to the closed circuit carbon dioxide absorption technique, asserting that the latter occasions more resistance to respiration, a contention which is not borne out when modern apparatus is employed. Further, his statement (page 81) that a flow of at least six litres of the gas mixture per minute is required to prevent carbon dioxide accumulation errs greatly on the side of inadequacy, since at least twice this quantity is necessary, as a simple calculation will show.

[1] "Anæsthesia in Operations for Goitre", by Stanley Rowbotham, M.D., D.A.; 1945. Oxford: Blackwell Scientific Publications, Limited. 8½" × 5½", pp. 112, with many illustrations. Price: 12s. 6d.

In the final section on post-operative care the value of oxygen therapy and fluid administration is very well stressed. Here an interesting new development, the injector oxygen mixture regulator, is illustrated and briefly described; this device permits of the dilution of oxygen with air in almost any desired proportion. Although atelectasis and pulmonary collapse are referred to on page 97, the possibility of their acute onset in the immediate post-operative stage is not indicated, while the imperative necessity for their early treatment by bronchoscopic suction receives no mention.

Finally, a few errors may be noted, as follows: on page 5 jugular vein for external jugular vein; on page 9 idiopathetic for idiopathic; on page 12 cystes for cysts; on page 14 morphia for morphine; on page 21 (footnote) double vagus block when double superior laryngeal nerve block is surely intended; on page 22 existence for possibility; on page 39 liable for apt; on page 40 Avertin (syn. Bromethol) for Bromethol (syn. Avertin); and on page 49 superficial cervical sympathetic ganglion for superior cervical sympathetic ganglion. These, however, are minor defects, and they detract only slightly from the general excellence of the work, which might well be studied carefully not only by anæsthetists, but also by surgeons as well. It is hoped that later and more comprehensive editions will duly appear, since even the material so far offered is of unique value.

RECENT WORK IN DERMATOLOGY AND SYPHILOLOGY.

"THE 1945 YEAR BOOK OF DERMATOLOGY AND SYPHILOLOGY", edited by M. B. Sulzberger, with the assistance of Rudolf L. Baer, is an interesting volume in which recent work on dermatology and syphilis is recorded.[1] It follows much on the lines of previous volumes of the series.

This year the volume opens with Part III of an article on skin tests and other immunological procedures in common dermatological and venereal conditions. The first part of the article was published in the year book of 1943 and the second part in that of 1944. The present part deals with drug eruptions (*dermatitis medicamentosa*: toxicodermas due to drugs). In the course of this article the following "important facts" about drug reactions are stated: "(i) In most drug reactions skin tests are of no aid in discovering the eliciting drugs. (ii) Only in exceptional instances, such as true eczematous and occasionally true urticarial drug eruptions, will the appropriate skin test prove valuable. (iii) In most drug reactions no specific serologic changes and no circulating antibodies are discoverable. (iv) In most drug reactions demonstration of the presence of a drug in the body fluids or tissues does not constitute proof of the causal role of that drug. It proves only that the drug was encountered by the patient and has not yet been entirely eliminated. (v) In most drug reactions failure to demonstrate a drug in the body fluids or tissues does not exonerate the drug as a possible causal agent. It proves only that at the time of examination the drug is not present in the quantity or form demonstrable by the methods used." This article takes on an added interest when it is read in conjunction with the section of the book devoted to drug eruptions. The drugs mentioned in this section include penicillin, sulphanilamide, sulphadiazine, sulphathiazole and sulphonamides generally, ephedrine, protamine zinc insulin and bismuth.

The book is arranged in thirteen sections, some of which, that on venereal diseases, for example, are divided into two or more subsections. The abstracts in these sections, many of which are commented on by the editors, are reinforced at the end of the section by a "supplementary bibliography" which should be useful to dermatologists. The first section is a large one and deals with treatment and prevention, exclusive of venereal diseases. The conditions discussed in it are many and varied. Many readers will be interested in a simple method of treatment that is described for sebaceous cysts. It comes from J. A. Danna, of New Orleans, and consists in the passage of a diathermy current into a needle inserted into the cavity of the cyst. The section on eczema, urticaria and allergy contains reference to endocrine allergy—allergic sensitivity to endogenous hormones. This is described by the editors as an interesting but very difficult field for investigation, and one containing many pitfalls. With this most clinicians will agree. In the section dealing with "Other Infections: Infestations", several references are made to cutaneous diphtheria, a condition which may be of considerable importance. The general conclusion is stated that antitoxic serum must be given to every patient with diphtheria of the skin, regardless of the course of the local lesion, in order to reduce the chances of development of systemic effects and sequelæ.

In the section on venereal diseases gonorrhœa is not considered. Syphilis is dealt with from the point of view of treatment, untoward reactions to treatment, diagnostic procedures and clinical aspects. Venereal diseases other than syphilis and gonorrhœa are discussed in a separate subsection, and space is also devoted to public health and venereal disease control.

The section to which dermatologists will direct their attention if they are really interested in the progress of their specialty is that called "Investigative Studies". This series of Year Books is the "Practical Medicine Series", and for this reason perhaps the important sections on investigations has been put almost at the end of the book. We should like to see it in the early sections.

[1] "The 1945 Year Book of Dermatology and Syphilology", edited by Marion B. Sulzberger, M.D., assistant editor Rudolf L. Baer, M.D.; 1946. Chicago: The Year Book Publishers, Incorporated. Melbourne: W. Ramsay (Surgical) Proprietary Limited. 7" x 4¾", pp. 360, with illustrations. Price: 24s.

CLINICAL BIOCHEMISTRY.

A SELECTION of reliable methods of analysis has been made by Dr. E. J. King in a volume entitled "Micro-Analysis in Medical Biochemistry".[1] Dr. King is the professor of chemical pathology in the British Post-Graduate School of Medicine, and in general the methods described are those used by the staff of that institution in their research and routine work. In some instances other methods have been included to provide a complete handbook of clinical biochemical estimations.

The book is devoted to technique, little space being given to interpretation of observations. The aim has been also to select those methods requiring least material and manipulation. All the usual requirements are covered. In addition, methods are given for the estimation of galactose and sulphonamides in blood, ascorbic acid in plasma and thiamin in urine. The estimation of enzymes required in clinical biochemistry is dealt with adequately. Throughout the book reliable qualitative tests are also described. The inclusion of a detailed description of the Parnas and Wagner modification of the Pregl micro-Kjeldahl method for estimating nitrogen is commendable in view of the increasing application of this method in biochemistry.

The chapter on photometry is an admirable summary of the relevant information. Throughout the book, where the use of artificial standards or light filters is recommended, the complete details including the names of manufacturers are given. Emergency methods with permanent standards are also dealt with in a small section. A bibliography of references to original and other material is provided. We were surprised to notice the omission of reference to "Practical Physiological Chemistry" by P. Hawk and "Practical Physiological Chemistry" by F. C. Koch. However, this is a useful compact volume for the laboratory worker in chemical pathology. The economy of space and the printing, binding and indexing are admirable.

A YEAR BOOK OF PHYSICAL MEDICINE.

"THE 1945 YEAR BOOK OF PHYSICAL MEDICINE", edited by Richard Kovács, presents a *résumé* of contributions to the literature of the subject for a period of twelve months.[2] The importance of the subject in the aftermath of war cannot be over-emphasized, and yet the work mentioned in this book is not confined to the application of physical methods of treatment to war casualties; the scope for the use of these methods in civilian practice has not become less. The book is divided into two main parts. In the first, recent work on physical methods of treatment is described; in the second, their application is discussed. Physical therapy is needed by every practitioner; the same may be said of this book, which sets out its latest developments.

[1] "Micro-Analysis in Medical Biochemistry", by E. J. King, M.A. (McMaster), Ph.D. (Toronto); 1946. London: J. and A. Churchill Limited. 8¼" x 5¼", pp. 176, with 16 illustrations. Price: 10s. 6d.

[2] "The 1945 Year Book of Physical Medicine", edited by Richard Kovács, M.D.; 1946. Chicago: The Year Book Publishers, Incorporated. Melbourne: W. Ramsay (Surgical) Proprietary, Limited. 7" x 4¾", pp. 400, with many illustrations. Price: 24s.

The Medical Journal of Australia

SATURDAY, JULY 27, 1946.

All articles submitted for publication in this journal should be typed with double or treble spacing. Carbon copies should not be sent. Authors are requested to avoid the use of abbreviations and not to underline either words or phrases.

References to articles and books should be carefully checked. In a reference the following information should be given without abbreviation: initials of author, surname of author, full title of article, name of journal, volume, full date (month, day and year), number of the first page of the article. If a reference is made to an abstract of a paper, the name of the original journal, together with that of the journal in which the abstract has appeared, should be given with full date in each instance.

Authors who are not accustomed to preparing drawings or photographic prints for reproduction are invited to seek the advice of the Editor.

THE TRAINING OF CLINICAL TEACHERS.

MEDICINE, the science and the art, cannot be learned from books alone. Books indeed—and with them we include medical periodicals—are indispensable to modern medicine; the enormous extent of the ground covered in its several branches, the intricacies of the detail in each of them and the continuous flow of reports on work carried out at the bedside and in laboratories will be among the reasons advanced by any student of medicine in support of this statement. At the same time the written word, be it never so clear, never so concise, must be amplified if not in some circumstances supplanted by personal tuition from a medical teacher at the bedside or in the out-patient department of a hospital. It was on teaching of this kind that the apprenticeship system of an earlier generation had to rely for most of its efficiency, and it is not without significance that today in certain branches of medicine something akin to the apprenticeship system is advocated for those who would become familiar with the handling of patients. We may be quite certain that the success of the apprenticeship system in the olden days varied with the skill of the principal and with his ability to impart knowledge to his pupil. In the same way we shall not be gainsaid if we hold that ever since instruction in hospital wards was first introduced into medical education by the Leyden professor Franciscus de la Boë, or Sylvius, in the seventeenth century, medical students have been largely dependent on the teaching ability of the practitioners in charge of wards to which they are allotted as clinical clerks, or, to use an old-time phrase, whose floors they "walk". It is curious that any practitioner of medicine who is appointed to the honorary staff of a teaching hospital is presumed to be able to teach students. He is appointed, or is supposed to be appointed, to the staff because of his knowledge and efficiency in a certain specialty, but so far as we are aware no question is ever raised about his skill as a teacher. That he can or cannot teach will be evident soon after he takes up work by the eagerness or lack of interest shown by students allotted to him.

The present state of affairs was aptly described in the "Report on Medical Education" of the Planning Committee of the Royal College of Physicians of London, issued in 1944, in the following words:

> The main burden in the teaching period has always fallen and still falls upon the honorary staffs of the teaching hospitals. They are hard worked men with many commitments in hospital and private practice. . . . The more able and self-sacrificing of them become loaded with administrative duties of one sort or another. In addition to these activities they are called on to teach, not for set terms, but continuously throughout the year, except for their annual holiday. They receive no, or only nominal, fees for their hospital and teaching services. No laboratory or office is set aside in the teaching hospital for their individual use, and they receive no secretarial or technical assistance. The wonder is that with all these difficulties any of these men have time or energy left for investigation, for personal reading and reflection, for preparing their teaching, and for learning something of the interests and difficulties of their individual clerks or dressers. But these conditions help to tip the scales in favour of sterile or didactic teaching during the clinical period.

If the report of the Royal College of Physicians is to be taken as a guide, teaching ability is considered when appointments are made to the clinical staffs of teaching hospitals in Great Britain. We read that "choice is made on a variety of grounds, including clinical ability, personality, contributions to new knowledge and ability to teach, all of which must be considered . . ." In this sentence will be found practically all that need be stated about the necessary attributes of a clinical teacher. We may add, however, something from the point of view adopted by the compilers of the well-known "Goodenough Report". Here it is stated that the ideal teacher has a wide and sound knowledge of his subject—if he is a clinical teacher his knowledge of medicine is allied to skill of a high order in medical practice. "He has a keen interest in students, their development and their ideas, and an ability to inspire and guide them as well as to instil knowledge into them."

The subject of clinical teaching and of clinical teachers is of growing importance today, when the number of students seeking entry to the profession of medicine is so great and many diverse types of young men and women are included among them. The large numbers of clinical teachers who take part in the medical education of students in our medical schools and hospitals have a role that is not less important than that of the professors and lecturers in what may be regarded as the more academic subjects. Their role may be more important because they are engaged in practice, and as most of the students will themselves become practitioners, they may consciously or unconsciously model themselves, their outlook and their behaviour on their clinical teachers. The student has to learn the technical side of his subject and its application to the needs of men and women. But he has to go further. He has to take cognizance of the social needs of man as an individual and as a member of a group; he must learn to discover the time and the place at which his medical knowledge can be applied to help to meet those needs.

But with all this the student has to absorb from his teachers something without which a great deal of his subsequent effort in the prevention of disease, in the cure of the sick and in the sociological sphere will fail of its full effect. This something is best described perhaps as the ethical tradition of medicine, based on a sense of values and on ideals of service, and built up through many centuries by the cumulation of all that has been good in the lives of devoted practitioners. The clinical teacher meets the student in the most susceptible years of his professional life. It is small wonder that in the section on teachers in the Goodenough Report reference is made to "the difficult and subtle art of teaching". We often hear it said that good teachers are born and not made. If teaching was done only by those born to be good teachers all would be well, but as we have seen, medical teaching has to be undertaken by those who may have no aptitude for it. In an address to the Section for the Study of Disease in Children of the Royal Society of Medicine, Professor N. B. Capon, discussing the training of clinical teachers, stated that clinical teachers in medicine could not claim to be born educators.[1] In order to ensure greater competence among clinical teachers or at least in order to provide opportunities for the development of greater competence, he suggested that an experiment might be started in one or two university centres where there happened to be a group of enthusiastic teachers. In this experiment a small group of senior teachers, aided by one or two preclinical teachers and the professor of education, would hold preliminary discussions and would arrange a vacation course for junior clinical teachers. Capon thinks that the numbers attending such a class should be restricted and that some persons should come from other centres in order that in discussions the views and habits of different schools should be presented. He gives an interesting list of aspects of education which would require treatment by lectures, in discussions or in demonstrations. The list includes: the meaning of education; the scope and aims of medical education; the historical approach in medical education and the value of non-medical literature; the artistic or humanistic approach; the scientific method, with special reference to experimental inquiry; elementary logic and statistics; the technique of clinical teaching; the place of psychology in teaching; the use of medical libraries; the preparation of scientific reports and papers. Capon does not think that a course such as he has advocated can do more than present a viewpoint, inspire interest and suggest a practical curriculum for study. The very initiation of such a course should make those who find themselves in the (possibly unwilling) role of teacher ask themselves whether they are qualified for the work. This discussion might be prolonged to include the selection of clinical teachers and the age group from which they might be selected. Reference might also be made to the possible setting up of some criterion of competence, a desirable if somewhat difficult process. The present intention is merely to draw attention to this important subject in the hope that one of the faculties of medicine in an Australian university will do something about it on the lines put forward by Capon. Action might be taken through one of the bodies concerned in post-graduate medical education.

[1] *Proceedings of the Royal Society of Medicine*, December, 1945.

Current Comment.

AN EXPERIMENT IN THE RATIONING OF FOOD.

AT the outbreak of the last war in September, 1939, an experimental investigation into the effect on health of drastic food rationing was undertaken in Britain for the Medical Research Council. The research was completed early in 1940 and an account of the work was circulated among government departments as an official paper. When in January, 1941, however, the Medical Research Council proposed to publish a full report, certain departments raised objections and the report was not published. These objections were maintained when the question of publication was again raised at a later stage in the war. What the Medical Research Council describes as "this unusual imposition of censorship on the results of medical research work" ended with the termination of hostilities and the report has now been published without alteration.[1]

In September, 1939, Professor R. A. McCance informed the Medical Research Council that he proposed with Miss E. M. Widdowson to study the effect on human beings of a diet (*a*) which might be available under conditions of war, and (*b*) at which the authorities ought to aim as a minimum even if the country was in dire straits as a result of the enemy blockade. The planning of the work "involved some prophecy as to what might happen with regard to feeding arrangements in the war". The prophecy tallied fairly closely with reality.

Eight persons were the subject of the experiment. After a preliminary week of taking ordinary food they were subjected to the experimental diets for periods varying from two weeks to three and a half months. During the preliminary period, during the period of the experiment and in certain cases during the post-experimental weeks, the subjects weighed all the food that they ate, noted how they enjoyed it, what effects it had upon them and whether they felt fit. In the preliminary period and during certain of the subsequent weeks six of the subjects collected their excreta for investigation and for chemical analysis. Laboratory tests of nutritional fitness were carried out from time to time on the long-term subjects, and towards the end of the experiment field tests consisting of mountaineering and of long-distance cycling were applied. The diet for the experiment consisted of unrationed and of rationed elements. The unrationed foods were potatoes, green and root vegetables and bread made from flour containing 92% of the original wheat and fortified with calcium carbonate. The rationed elements for each week comprised 16 ounces of meat, fish, poultry or rabbit; four ounces of cheese; four ounces of margarine (this was the total fat allowed); five ounces of sugar, including jam, marmalade *et cetera*; two ounces of oatmeal; four ounces of rice; ten ounces of pulse; one egg; 35 ounces of whole milk; six ounces of fruit. These amounts were a good deal less than those allowed in the war-time rations. The war-time rations included each week eight ounces of fat, eight ounces of sugar and some jam; from two pints up to unrestricted amounts of milk were allowed with some dried separated milk; the amount of meat was what could be obtained for one shilling and twopence, together with three to six ounces of bacon *plus* unrationed fish, poultry and rabbits. The war-time allowance of cheese was four ounces and later three ounces of cheese. The degree, form and extent of the adaptation to the experimental diet demanded of each subject varied with the diet to which he had previously been accustomed. All who were tested for three months made satisfactory adjustments; one person whose physical adaptation was good was apprehensive and worried and was regarded as having failed in psychological adaptation. The diets themselves are described as containing quite enough protein, though they were inevitably low in animal protein. They contained

[1] "An Experimental Study of Rationing", by R. A. McCance and E. M. Widdowson; 1946. Medical Research Council of the Privy Council, Special Report Series Number 254. London: His Majesty's Stationery Office. 9¼" x 6", pp. 62. Price: 1s.

very little fat but correspondingly large amounts of carbohydrate, most of which was in the form of starch. The diets provided as much calcium as normal diets, plenty of phosphorus and other minerals and much more vitamin B_1 and vitamin C than most English diets. A study of excretions showed that the urine of each subject contained about the same amounts of magnesium and phosphorus as before. The urine contained less calcium, suggesting that less was absorbed, and this was at first attributed to a vitamin D deficiency, but it was found impossible to alter the urinary/fæcal ratios by giving moderate doses of calciferol. Once the subjects had adjusted themselves they were satisfied and content; they liked the food, approached it with gusto and did not find it monotonous. The health of the subjects was particularly good all the time that they were living on this restricted dietary, and at the end of three months they were able to take prolonged and severe physical exercise without undue fatigue. The "inevitable" conclusion was that once an adult had become accustomed to the diet, it was satisfactory for all ordinary purposes.

The result of this investigation must have been surprising to those in war-time Britain who had to do with the food supplies during the stressful days of the war. It was recognized that if restrictions as severe as those of the investigation had to be faced, the problem would be how to effect their introduction and have them accepted by the people. One or two prominent facts and conclusions may be mentioned. First of all, if the food of the people is rationed in certain directions, they will certainly try to keep up their Calories from unrationed foods. Again it is pointed out that since the three staples, wholemeal bread, potatoes and green vegetables, were of the greatest value, not only should everything be done to leave them unrationed in a crisis, but rich and poor should alike be able to command them. Perhaps the most important statement in regard to food itself is that for emergency rations, only flour containing 92% of the original wheat should be considered. Again if a milk shortage is envisaged at any time, calcium should be added to the bread.

This work is likely to have results in other spheres than those of war. This is shown by the observation that the authors of the report could see no justification for the enormous amounts of meat in the rations of the British soldier; they considered that troops, at least in Britain, would be just as well served with bread made from a lightly milled flour, more potatoes if necessary, and less meat. Had such views been published during the war, they would have received a warm welcome from many civilians, particularly from harassed housewives. This work may also be useful to those who plan food relief for countries affected by the present world food shortage.

PENICILLIN IN THE TREATMENT OF SYPHILIS.

On June 26, 1944, penicillin was chosen as the drug to be used in the treatment of syphilis by the United States Army in the European theatre of operations. Colonel D. M. Pillsbury, of the Medical Corps of the Army of the United States, in a recent report[1] states that by June 15, 1945, over 14,000 patients with early or latent syphilis, or with syphilis which had not responded satisfactorily to previous treatment with standard or intensive arsenobismuth therapy, had received treatment with penicillin. Of these, 792 have been subjected to a follow-up examination six or more months after treatment. Pillsbury points out that the principal criteria for evaluating any system of treatment for syphilis include: (*a*) the initial effect on the presenting lesions, (*b*) the control of infectiousness, (*c*) toxicity, (*d*) the incidence of clinical relapse, (*e*) the incidence of serological relapse, (*f*) the maintenance or achievement of "seronegativity", (*g*) the incidence of asymptomatic or symptomatic neurosyphilis, (*h*) the incidence of other late manifestations of syphilis, (*i*) the incidence of reinfection after treatment, (*j*) the prevention of congenital syphilis. He discusses these in turn and makes comparisons on the basis of his experience between the results achieved by prolonged arsenical heavy metal therapy, twenty-day intensive arseno-bismuth therapy and penicillin therapy. The one score on which penicillin has proved inferior to intensive arseno-bismuth therapy is in regard to the reversal of the positive serological findings. The toxicity of penicillin therapy is negligible, and infectivity with rare exceptions is promptly controlled. The incidence of infectious relapse is low (71 instances are recorded), and it appears that this relapse usually occurs within twenty weeks of treatment. Pillsbury's general conclusion that the initial promise of penicillin as the best single agent against syphilis is being fulfilled, is encouraging. It must, however, be accepted with what J. E. Moore in 1943 described as "restrained optimism".

[1] *American Journal of Syphilis, Gonorrhœa and Venereal Diseases*, March, 1946.

MEDICAL POLITICS IN SOUTH AFRICA.

Readers of this journal are probably aware that the medical profession in South Africa has recently formed the Medical Association of South Africa as an organization which is not part of the British Medical Association. Until recently the South African organization was known as the Medical Association of South Africa (British Medical Association), and one of its objects was to act as a corporate group of Branches of the British Medical Association. The change was made because most of the members in South Africa wanted it and the Medical Association of South Africa is like the Canadian Medical Association, an independent body in affiliation with the British Medical Association. It is interesting to note the trends among some of the Branches of the new body as reflected in two notices of motion received from two Branches for presentation at the next meeting of the South African Federal Council. One Branch recommends to the Federal Council that "in changing the Constitution of the Medical Association of South Africa, Parliament should be prevailed upon to grant a charter to include a rule that membership of the Association should be compulsory, in the same way as is laid down by the Charter of the Law Society of South Africa". A second Branch would delete from the Memorandum of Association a clause which is known as the restrictive clause. It is as follows:

> Provided that the Association shall not support with its funds any object or endeavour to impose on or procure to be observed by its members or others any regulation, restriction or condition which, if an object of the Association, would make it a trade union.

These notices of motion are set out in the *South African Medical Journal* for April 13, 1946. The editorial comment is that: "In this world of change it is necessary that we keep in touch with all the developments which take place day by day, and the tendencies to change which may become apparent as time goes by." Clearly these two proposals have far-reaching implications. The decisions of the Federal Council of the Medical Association of South Africa will be followed with interest in this country.

A BIBLIOGRAPHY OF SCIENTIFIC AND INDUSTRIAL RESEARCH.

In another place in this issue a "Bibliography of Scientific and Industrial Research" makes its appearance. This bibliography consists of a series of short abstracts covering scientific research that has been carried out in different parts of the world during the recent war. The Council for Scientific and Industrial Research, which is receiving the information from the United States Department of Commerce, has suggested that much of the information will be of value to readers of this journal and has offered to send it regularly for publication. In accepting the offer of the Council for Scientific and Industrial Research, we wish to express our keen appreciation of its action.

Abstracts from Medical Literature.

PÆDIATRICS.

The Prevention of Rheumatic Recurrences in Children by the Use of Sulphathiazole and Sulphadiazine.

R. E. WOLF, LOUISE W. RAUH AND R. A. LYON (*Journal of Pediatrics*, December, 1945) report on their experience in the prophylactic use of sulphathiazole and sulphadiazine in rheumatic children. A group of seventy children who received the treatment for a total of eighty-one patient seasons suffered no recurrences of rheumatic fever during the periods of treatment. One child developed a recurrence during a summer season between courses and another developed subacute bacterial endocarditis during the same period. A third child developed subacute bacterial endocarditis while being treated. Reactions among seventy-eight children treated for ninety patient seasons consisted of albuminuria in nine patients receiving sulphadiazine, and in four instances it was so severe that the drug was withdrawn. Mild leucopenia occurred in four patients, two of whom were receiving sulphadiazine and two sulphathiazole, but the number of white cells quickly returned to normal when the drug was withdrawn for a few days. Slight rashes occurred in two cases, but none of the children in the group developed symptoms of nausea, vomiting or fever. Although the reactions were mild, they sometimes occurred as late as five months after the inauguration of the course of treatment. Sulphathiazole and sulphadiazine appear to be safe and effective drugs to administer prophylactically to children over long periods of time, but the patients must be observed frequently for the detection of reactions. It must be certain that the patient has completely recovered from his acute infection before prophylactic treatment is started. Since rheumatic infections occur during the summer months, it seems likely that prophylactic treatment with sulphonamides should be continued throughout the entire year. In many cases it would seem advisable to administer the drug continuously for several years. The hospital, school and convalescent home seem better places in which to administer the treatment than the office or out-patient clinic, because of the opportunities to observe the patients closely and to be certain that the drug is taken regularly. However, if the patient is cooperative and if laboratory facilities are available to the physician in his office or clinic, it is practical to treat the child as an out-patient and thus shorten the period of his stay in the hospital or convalescent home.

Borderline Cases of Pyloric Stenosis.

GAYLORD W. GRAVES (*Archives of Pediatrics*, March, 1946) presents the records of two typical unhospitalized patients as exemplifying the borderline status of pyloric stenosis and the possibility of recovery, without undue risk, through the application of an ordinary thick cereal feeding procedure, with due conservatism. The term "borderline", while not definitive, is intended to imply that the case thus characterized presents inconclusive evidence of pyloric obstruction, and therefore uncertain indications for surgery in spite of the existence of obvious pylorospasm. The author points out that the non-operative treatment of pylorospasm in infancy has for many years comprised such measures as restriction of food, with sugar and fat kept at a minimum, substitution of breast milk for other milk, frequent gastric lavage and the use to physiological effect of sedatives, such as phenobarbital, and antispasmodics, such as atropine and "Syntropan", the dosage being determined by individual tolerance. In the case of atropine, dosage has ranged as high as 1/200 of a grain every four hours with due caution in administration and supervision. While such measures are undoubtedly of supplemental value, experience with thick cereal feeding warrants the belief that any infant exhibiting pylorospasm without convincing signs of stenosis should not be considered to have had adequate provisional non-operative treatment without trial of twenty-four to forty-eight hours of thick feeding. Failure to retain food upon such a trial, particularly in the presence of dehydration, should be the signal for hospitalization, parenteral fluid administration and the withholding of all oral feeding preparatory to operation at the surgeon's own timing. Although concentrated cereal-milk feeding became popularized more than two decades ago, it has undoubtedly been neglected of late, not only because of the increasingly good results from operative procedure, but also because of failure to utilize thick feeding judiciously with due limitation to capacity. The following rules have been evolved empirically: (i) The aim of the employment of thick cereal feeding in the presence of vomiting should be primarily therapeutic rather than nutritional. At the outset feedings should be limited to about two tablespoonfuls, and water should be limited to about one ounce two and a half hours after every cereal feeding. These amounts should be increased as soon as tolerance is established. (ii) The mixture should be concentrated to the thickness of library paste, when it will adhere to an inverted spoon. Suitable consistency will be obtained when a twenty-ounce mixture containing four tablespoonfuls of farina with appropriate proportions of milk and water is cooked down to about fourteen ounces. (iii) High sugar percentages, particularly high maltose percentages, are ill-adapted to the treatment of vomiting patients. (iv) Orange juice and cod liver oil should be replaced by ascorbic acid or a vitamin *D* concentrate. (v) A four-hour interval between feedings is theoretically desirable, but in an individual case may be found impracticable if the infant is very hungry and vomiting is not increased under a three-hour schedule. (vi) A frank understanding with parents of the importance of close cooperation and of the limitations of non-surgical treatment is essential at the outset. (vii) In the event of operation, pre-operative restoration of fluid and transfusion are highly important safeguards. Finally, it should be noted that although radiological studies of patients not operated on for several years after recovery are reported to have shown some evidence of persisting hypertrophy and small lumen, the emptying function for ordinary gastric contents of such recovered patients has been found apparently normal. A number of previous cases have been followed over a period of years without apparent clinical evidence of alimentary dysfunction as a sequel to non-operative management by the method which has been reviewed.

Coronary Occlusive Disease in Infants and Children.

WALTER A. STRYKER (*American Journal of Diseases of Children*, March, 1946) draws attention to the occurrence of coronary occlusive disease in infants or in children which may be a cause of death of such patients. From a series of autopsies and from the literature cases have been assembled illustrating the eight types of lesions which may be found. These eight types include medial calcification with fibroblastic proliferation of the intima, *polyarteritis* (*periarteritis*) *nodosa*, arteriosclerosis (atherosclerosis), syphilitic arteritis, embolism, congenital abnormalities, rheumatic arteritis and intimal proliferation due to hypertension.

The Nature of Still's Disease.

F. A. LANGLEY (*Archives of Disease in Childhood*, December, 1945) reports a case of Still's disease and discusses the nature of this disorder. The anatomical changes in the joints and glands are considered and a summary of the morbid anatomical findings described in the literature of Still's disease is presented. In regard to the nature of the disease, the author concludes that it is not a form of tuberculosis, rheumatic fever, rheumatoid arthritis or an endocrine disorder, but an independent type of arthritis of infective origin.

Sinus Bradycardia in Acute Rheumatic Fever.

ARTHUR M. GROSSMAN AND ASHTON GRAYBIEL (*Archives of Pediatrics*, March, 1946) report two cases of rheumatic fever with extreme slowing of the heart due to sinus bradycardia. These cases are striking exceptions to the general rule that the pulse rate is elevated in active rheumatic infection. Indeed, it is not uncommon for the quickening of the pulse rate to be out of proportion to any increase in body temperature, and consequently sinus bradycardia stands out sharply by contrast. This slowing of the heart is certainly of diagnostic significance and should be familiar to all physicians who may have patients with rheumatic fever under their care. Although the intimate nature of the cause of the sinus bradycardia is unknown, it seems reasonable to assume that the "vagus mechanism" may be the chief factor in most instances. Keith and Glazebrook and Thomson found that the sinus bradycardia is abolished following injection of atropine. This would seem to be in agreement with the observations of Bruenn and many others, that the prolonged *P-R* interval, so frequently found in active rheumatic infection, can also be abolished by atropine. Also in line with these results are the recent observations of Gubner and others who were able readily to induce prolongation of *A-V* conduction time in a large pro-

portion of rheumatic fever cases. In the two cases presented it is apparent that no constant relationship exists between sinus bradycardia and prolongation of the *A-V* conduction time. This could be readily explained, assuming that the same fundamental mechanism is responsible, on the basis that predominant involvement in or around the sino-auricular node would result in bradycardia, while involvement round the auriculo-ventricular node would result in prolongation of the conduction time. This being true, the clinical significance of the two findings would be much the same.

ORTHOPÆDIC SURGERY.

Restoration of Muscle Power by Heavy-Resistance Exercises.

THOMAS L. DELORME (*The Journal of Bone and Joint Surgery*, October, 1945) discusses the redevelopment of muscle power chiefly in the quadriceps muscle, following injuries and operations on the knee joint. The author states that low-repetition, high-resistance exercises produce power, high-repetition, low-resistance exercises produce endurance, and each of these two types of exercise is incapable of producing results obtained by the other. Weakened, atrophied muscles should not be subjected to endurance-building exercises until the muscle power has been restored to normal by power-building exercises. The author states that restoration of muscle power with return of motion in a limb has been neglected in the past. It is in most instances better to have a limited range of motion with good power than a normal range of motion with inadequate power. In order to obtain rapid hypertrophy in a weakened, atrophied muscle, the muscle should be subjected to strenuous exercise and, at regular intervals, to the point of maximum exertion. The author concludes that in cases of meniscectomy and unstable knee, quadriceps power should be obtained by the use of strenuous, non-weight-bearing exercises. Weight-bearing exercises can produce pain, thickening and fluid in knees which do not have adequate muscle support.

Surgical Obliteration of Bone Cavities following Traumatic Osteomyelitis.

MARVIN P. KNIGHT AND GEORGE O. WOOD (*The Journal of Bone and Joint Surgery*, October, 1945) describe a method of treatment which they claim expedites healing, and obliterates cavities in long bones. The first operation consists of early and complete sequestrectomy, and this is followed in about seven days by the application of a split-thickness skin graft as a dressing, applied meticulously into the depths of the saucerized area. The authors state that these procedures effectively convert an infected wound into a closed fracture so that the wound remains healed and dry. The defect in the bone is later treated by excision of the skin graft, application of bone chips and the transfer of a full-thickness skin graft. The authors report the results of the above treatment in 23 cases. The wounds in all but two of these cases have healed. In the two cases in which healing was not complete, error in skin grafting technique, resulting in inadequate blood supply, was considered to be the cause of failure to secure sound soft tissue healing. Bone sepsis was eradicated in all cases; and in all the bone defects were eliminated. The average age of this series of patients was twenty-four years, the average interval from the injury to the initial step was three to five months. The average interval that elapsed between sequestrectomy and split-skin grafting was 16 days. The average interval from split skin grafting to the final operation was 85 weeks.

Acute Ischæmia of the Anterior Tibial Muscle and the Long Extensor Muscles of the Toes.

CARL E. HORN (*The Journal of Bone and Joint Surgery*, October, 1945) discusses a peculiar type of vascular disturbance localized to the anterior fascial compartment of the leg, observed in young and otherwise healthy soldiers. The characteristic signs and symptoms were as follows: (*a*) sudden onset of severe pain in the anterior compartment of the leg; (*b*) rapid development of swelling, most marked over the anterior fascial compartment; (*c*) mild to intense erythema and glossiness over the same area; (*d*) slight to complete interruption of the function of the common peroneal nerve. The author demonstrated in two patients that there is a fibrosis of the media, adventitia and periarterial tissue of the anterior tibial artery with ensuing occlusion. The histological changes in the affected muscles are identical to those occurring in Volkmann's ischæmia. The author points out that the musculature of the anterior fascial compartment is particularly vulnerable to circulatory disturbances because of the anatomical arrangement. He considers that the pathogenesis is obscure, but that the syndrome may be explained by repeated overwhelming physiological demands upon the anterior tibial artery such as occurs in long periods of training in the infantry and in athletics. The acute onset of severe ischæmia during marching may be due to muscular exhaustion and swelling in the anterior compartment. Patients with mild symptoms are treated expectantly, with rest in bed and elevation of the leg. The author states that early block of the lumbar sympathetic ganglia and early complete vertical incision of the deep fascia usually improve the collateral circulation and permit the return of function to the common peroneal nerve in patients who have had much manipulation. If segmental arterial spasm persists, or if arterial occlusion is present, arteriectomy is performed. The author also considers that idiopathic claw-foot may be the result of insufficiency of the anterior tibial muscle and of the long extensor muscles of the toes.

Sciatica as an Orthopædic Problem.

KENNETH H. PRIDIE (*The Practitioner*, August, 1945) states that in his opinion rupture of an intervertebral disk is the most common cause of sciatica. The patient first has an unstable back which leads to a ruptured intervertebral disk. When the disk has been removed, the spine is still by no means normal and there is still the problem of the unstable back. By operation the pressure on the nerve can be removed, but some patients will need a second operation for stabilizing the back by a graft between the two affected vertebræ. The author points out that it is necessary to be on the lookout for the early signs of disk lesions, so that in such cases operation may be prevented. If the patients are seen early and treated by immobilization in plaster jackets the condition can be cured at an early stage, and further prolapse of the disk will be prevented. The author states that it would seem that such patients make a natural recovery. No patient should be operated upon until conservative treatment has been honestly tried. The author considers that removal of a herniated disk is not an operation that should be lightly undertaken, nor has it been performed for sufficiently long to show the absolute end-results.

Aseptic Necrosis of the Astragalus following Arthrodesing Procedures of the Tarsus.

FREDERICK M. MAREK AND ALBERT J. SCHEIN (*The Journal of Bone and Joint Surgery*, October, 1945) discuss the arterial supply to the astragalus and report five cases in which aseptic necrosis of the body of the astragalus followed arthrodesing procedures in the tarsus. These occurred in a series of 61 cases. The authors conclude that when the exsection of wide wedges is essential, the scaphoid should be sacrificed in preference to the astragalar neck. It is pointed out that aseptic necrosis, if present, can be detected by radiographic examination as early as three to four weeks after operation. If aseptic necrosis is detected, weight-bearing should not be permitted until revascularization is complete. In the adolescent revascularization takes place rapidly (six to nine months). If premature weight-bearing is allowed in these cases, the body of the astragalus will become compressed, and the ankle joint surface damaged, with resultant secondary osteoarthritis of the ankle joint.

A Cast-Caliper Brace for Immobilization of the Hip.

GEORGE S. PHALEN (*The Journal of Bone and Joint Surgery*, October, 1945) describes a method of splinting which enables a patient with chronic osteomyelitis in the region of the hip joint to walk about. A short snugly fitting hip spica is applied which includes the lower part of the thorax and extends to just above the knee. The author points out that it is essential to non-weight-bearing through the hip that the cast should be moulded accurately about the pelvis and firmly below the iliac crests. Two metal inserts are incorporated in either side of the thigh portion of the cast. These inserts are fitted with three bolts to which a ringless caliper brace is fastened. The distal ends of the caliper attachment are fitted into a tube in the heel of the shoe. The author considers that it is necessary to wear the shoe both day and night in order to prevent rotation of the leg. The caliper attachment is fitted with hinges at the knee which are locked when the patient is ambulatory. The caliper attachment may be removed daily for physical therapy of the knee, ankle and foot, provided the necessary care is taken to prevent rotation of the leg. A spica cast is considerably more comfortable for weight-bearing than the ring of an ischial weight-bearing splint.

Bibliography of Scientific and Industrial Reports.[1]

THE RESULTS OF WAR-TIME RESEARCH.

During the war a great deal of research was carried out under the auspices of the Allied Governments. It has been decided that a large proportion of the results of this research should now be released for general use.

The United States Department of Commerce, through its "Publication Board", is now issuing abstracts of these reports in the form of a "Bibliography of Scientific and Industrial Reports". The complete bibliography is being received in Australia, and extracts likely to be of interest to readers of this journal will be reproduced as far as practicable each week.

The original reports may be obtained in two ways: (a) Those marked with an asterisk may be obtained without cost on making application to Secondary Industries Division (Department of Post-War Reconstruction), Wentworth House, 203, Collins Street, Melbourne, C.1. (b) In other cases microfilm or photostat copies of the original report may be purchased from the United States through the Council for Scientific and Industrial Research Information Service. Readers desiring to avail themselves of this service should send the Australian equivalent of the net United States price to the Council for Scientific and Industrial Research Information Service, 425, St. Kilda Road, Melbourne, S.E.2. All other charges will be borne by the Council for Scientific and Industrial Research.

Further information on the subjects covered by the reports and kindred subjects may be obtained by approaching the Council for Scientific and Industrial Research Information Service, the Secondary Industries Division, Department of Post-War Reconstruction, or the Munitions Supply Laboratories (Technical Information Section), Maribyrnong, Victoria.

GRINKER, ROY R., AND SPIEGEL, JOHN P. War neuroses in North Africa (the Tunisian campaign). Off. Pub. Bd., Report, PB 1052. 1943. 303 pp. Price: Photostat, $21.00; Microfilm, $3.50.

This report is an account and analysis of neuropsychiatric casualties encountered during the fighting in Tunisia between January and May, 1943. It is based on clinical experience in handling and treating many cases. The authors believe that war neuroses are complicated syndromes, all based on anxiety and all dealing with this emotion in some form or other. They believe, too, that war neuroses offer the best opportunity for the study of ego functions and their interrelation with biological and psychological drives.

HASTINGS, DONALD W., WRIGHT, DAVID G., AND GLUECK, BERNARD C. Psychiatric experiences of the Eighth Air Force, first year of combat, July 4, 1942, to July 4, 1943. Off. Pub. Bd., Report, PB 1051. 1944. 311 pp. Price: Photostat, $21.00; Microfilm, $3.50.

Summary of psychiatric experience with combat personnel in the Eighth Air Force during its first year of operational flying. Clinical data are discussed on types of psychiatric and operational fatigue cases. The report also includes a study of successful combat personnel, methods of treatment of psychiatric difficulties, and a suggested plan for the organization of a psychiatric programme in an air force. Appendix contains illustrative cases.

LAMBERTSEN, C. J. Report on problems of shallow water diving based upon experiences of OSS underwater swimmers (the Lambertsen amphibious respiratory apparatus). Off. Pub. Bd., Report, PB 1032. 1945. 102 pp. Price: Photostat, $7.00; Microfilm, $1.50.

This report consists of two parts. Part 1 is an illustrated manual describing the oxygen rebreathing or self-contained respiratory apparatus developed by Capt. C. J. Lambertsen and manufactured by Ohio Chemical and Mfg. Co., Minneapolis. Part 2 is a report describing the experiences of the Maritime Unit, Offices of Strategic Services, in training men in its use and the problems peculiar to shallow water diving and free underwater swimming using no safety lines. Problems of underwater swimming—rapid changes of pressure, necessity for using respiratory apparatus to provide a breathable atmosphere, and the existence of unfamiliar forms of life in the sea—are described. The diving apparatus used comprises a mask, breathing tube, a canister for absorption of exhaled carbon dioxide, a breathing bag and a controllable oxygen supply, all mounted upon a canvas vest. The unit weighs 26 pounds in air and is weightless when submerged. Oxygen supply is sufficient for at least two hours of moderate underwater work. Practical diving with this equipment is limited to depths of no more than about sixty feet of water due to the toxicity of pure oxygen at higher pressures. The diver has controllable buoyancy and is independent of aid from the surface. Incidence of problems which occurred during more than 5,000 man hours of diving by 38 men is given.

ROSE, GERHARD. The problem of the role of the housefly in the transmission of bacillary dysentery. Off. Pub. Bd., Report, PB 1689. n.d. 28 pp. Price: Microfilm, 50c.; Enlargement Print, $2.00.

This is an unpublished typewritten manuscript. Experiments are described and discussed on the persistence of various bacteria (such as bacillary dysentery, typhus, *B. coli* (from mice) etc.) in the intestines of flies, from the maggot stage right through to the adult fly stage.

WRIGHT, DAVID G. Observations on combat flying personnel. Off. Pub. Bd., Report, PB 1861. 1945. 64 pp. Price: Microfilm, $1.00; Photostat, $5.00.

Compilation of nine papers by nine flight surgeons based on their experiences with units engaged in combat under varying circumstances. They include the following: 1. Fifty Missions over Europe, by Robert Rehm. 2. Experiences with Anxiety States in Combat Flying Personnel, by Milton Layden. 3. Effects of Combat Flying Stress, by John P. Spiegel. 4. The Combat Man Presents Himself, by Cecil D. Conrad. 5. The Emotionally Unstable, by Trent W. Smith. 6. Flying Fatigue, by John E. Dougherty. 7. Emotional Disorders of Pilots in Assam, India, by Gilbert J. Kaplan. 8. War Weariness, by Edward Dengrove. 9. Anxiety Reaction in Fighter Pilots, by Gerald Krosnick.

GALDSTON, MORTON, LUETSCHER, JOHN A., AND LONOCOPE, WARFIELD T. A study of the residual effects of phosgene poisoning in human subjects. (Chemical Warfare Service. Medical Division Report 49.) Off. Pub. Bd., Report, PB 4039. 1945. 82 pp. Price: Microfilm, $1.00; Photostat, $6.00.

Detailed study of individuals exposed to phosgene gas to determine whether there is evidence of early anatomic and physiologic derangement in pulmonary function and to correlate these changes with symptoms and clinical and psychiatric findings. One group of patients had survived severe acute phosgene poisoning; the others had been exposed to small amounts of the gas over a period of years. In both groups of patients alteration of pulmonary function became apparent as a result of the test performed. It was noted that neurasthenic symptoms have been the most disabling features in these patients. Appendix has individual case histories for the eleven patients. Bibliography.

GILMAN, ALFRED Z., *et alii*. The effect of BAL on systemic cadmium poisoning. (Chemical Warfare Service. Medical Division Report 57.) Off. Pub. Bd., Report, PB 4033. 1945. 19 pp. Price: Microfilm, 50c.; Photostat, $2.00.

Description of procedure in, and presentation of results obtained from the investigation of the effect of BAL on the course of systemic cadmium intoxication. This study was undertaken in order to obtain an understanding of the basic physiological mechanisms of BAL-cadmium antagonism. As a result of tests which indicated high toxicity of Cd (BAL)$_2$ to the kidney, it was recommended that BAL not be used for the treatment of systemic cadmium poisoning. References and tables of data are given.

HICKAM, JOHN B. Experimental studies of wounds made by standard U.S. ammunition. (Army Air Forces. Engineering Division. ENG-49-697-1-1.) Off. Pub. Bd., Report, PB 5165. 1944. 66 pp. Price: Microfilm, $1.00; Photostat, $5.00.

A report by the Aero Medical Laboratory of experiments investigating the wounding effect of ·30 calibre M1 ball, ·50 calibre ball and armour piercing, and 20 mm. ball ammunition. Sheep were used as experimental animals. Conclusion: (1) standard ·30 and ·50 calibre bullets, fired at close range (50 yards) through soft tissues produce small clean wounds of entrance and exit; (2) when a bone is hit by ·30 or ·50 calibre bullets, it is extensively shattered, and a large, ragged soft-tissue wound is produced around the bone; (3) when ·30 or ·50 calibre bullets are tumbled prior to striking an animal, enormous destructive wounds result; and (4) small fragments torn from the outer jacket of a ·50 calibre armour-piercing bullet are easily capable of inflicting fatal wounds. Numerous photographs (some being colour transparencies that will reproduce poorly) and bibliography are included.

KAPLAN, L., AND NOLLER, C. R. The synthesis of toxic carbamates of aminoalcohols (doryl homologs and analogs).

[1] Supplied by the Information Service of the Council for Scientific and Industrial Research.

to November 15, 1944. (OSRD Report 4662.) Off. Pub. Bd., Report, PB 5489. 1945. 19 pp. Price: Microfilm, 15c.; Photostat, $2.00.

Fourteen new homologs and analogs of doryl (carbamic acid, 2 dimethylaminoethyl ester methochloride) have been prepared and submitted to the Chicago Toxicity Laboratory for subcutaneous toxicity tests. None of the compounds showed any toxicity to mice at the level of 80 mg. per kilogram. This is a progress report under Contract 9-135, OEMsr-136, with Stanford University.

KOELLE, GEORGE B. Systemic phosphorous poisoning: A review of the literature. (Chemical Warfare Service. Medical Division Report 31.) Off. Pub. Bd., Report, PB 4046. 1944. 20 pp. Price: Microfilm, 50c.; Photostat, $2.00.

Approximately 200 publications, mostly from foreign literature, on the various aspects of phosphorus poisoning, have been reviewed and a compilation of the findings is listed in this report. Conclusions: (1) possibility of incurring systemic phosphorus poisoning from a WP burn is slight; (2) explosive phosphorus poisoning has been proven to be satisfactory. Appendix contains comprehensive bibliography.

BALL, ERIC G., *et alii*. A study of the ability of compounds with high competition factors to counteract the injurious effects of mustard gas. (OSRD Report 3366.) Off. Pub. Bd., Report, PB 4204. 1943. 38 pp. Price: Microfilm, 50c.; Photostat, $3.00.

This is a formal progress report under contract with Harvard University, dated August 26, 1943. It summarizes a considerable portion of the work on the therapeutic potentialities of various compounds with high competition factors. An effort has been made with such compounds to counteract the local vesicant action of mustard on the skin and to counteract the systemic effects of mustard after skin absorption. An attempt was made to learn what naturally occurring substances show a high competition factor for mustard. It seems clear from the work of these investigators, and from other studies bearing on the problem, that mustard reacts with cellular constituents, either locally in the skin or after systemic absorption, so rapidly that there is practically no opportunity for interception by any substance administered after exposure, even if one possessing both a very high competition factor and high cell penetrating power, as well as other physiological requirements, were available. Report includes table showing results of the experiments, and a list of references.

BALL, ERIC G., *et alii*. A study of the composition of the blood and urine of rabbits and rats as affected by the administration of H. (OSRD Report 3923.) Off. Pub. Bd., Report, PB 4230. 1944. 13 pp. Price: Microfilm, 50c.; Photostat, $1.00.

A preliminary study of the composition of the blood and urine of rabbits and rats as affected by the administration of H has been carried out in the hope that some clue might thereby be obtained as to the causes of death in systemic mustard poisoning. A marked increase in blood N.P.N., chiefly accounted for as urea, a rise in blood cholesterol and a slight but significant fall in blood chloride were observed. Observations on the urine of rabbits showed that despite a marked fall in food intake, the total nitrogen excretion remained at normal or even higher, indicating an enhanced endogenous catabolism of protein.

DILL, DAVID B. Limits of high altitude flight. (Army Air Forces. Experimental Engineering Section, EXP-M-54-653-103A.) Off. Pub. Bd., Report, PB 5175. 1942. 8 pp. Price: Microfilm, 50c.; Photostat, $1.00.

Report of experiments, the purposes of which were: 1. To derive a method for calculating the ratios of nitrogen to oxygen in inspired mixtures of these gases that will yield given partial pressures of oxygen in the lungs. 2. To calculate these ratios and to illustrate their use. 3. To discuss the hazards of anoxia and of aeroembolism in prolonged high altitude flights. Tables and calculations in the appendices give detailed information.

HICKAM, JOHN B. Wounding effect of the German 20 mm. HE shell. (Army Air Forces. Engineering Division. Eng-49-697-1-L.) Off. Pub. Bd., Report, PB 5166. 1944. 56 pp. Price: Microfilm, $1.00; Photostat, $4.00.

A report on Aero Medical Laboratory experiments on the anti-personnel characteristics of the German 20 mm. HE shells and the protection afforded by the flak suit. These shells have a large explosive charge and throw their fragments at a wide angle. Approximately 100 of these fragments are capable of causing a serious wound. Detonation and fragment spray explosion of these shells, using sheep as experimental animals, show that this shell is extremely effective for use against unarmoured personnel in aircraft. The flak suit resists perforation by all but a few fragments. Numerous photographs and diagrams.

MCMASTER, PHILIP D., *et alii*. The development of methods for testing the abilities of agents to combat the effects of mustard gas, H, and other vesicants upon the skin, to February, 1945. (OSRD Report 4853.) Off. Pub. Bd., Report, PB 5492. 1945. 43 pp. Price: Microfilm, 50c.; Photostat, $3.00.

A full description of the tests employed and reasons for the use of certain techniques are given. Tests covered the following conditions: the production of uniform lesions for comparison, the effects of variation in the amount of vesicant used, the effects of solvents and vehicles for the test substances, dilution and spreading effects, differentiation of mere surface decontamination from true intradermal therapeutic action and the establishment of suitable control lesions. Progress report under Contract 9-280, OEMsr-434, with the Rockefeller Institute for Medical Research.

MCMASTER, PHILIP D., *et alii*. A search for decontaminating and treatment agents for skin exposed to mustard gas, H, to March, 1945. (OSRD Report 4854.) Off. Pub. Bd., Report, PB 5493. 1945. 60 pp. Price: Microfilm, $1.00; Photostat, $4.00.

A summary of the findings obtained with several hundred substances tested. None was found which could be considered superior to the M-5 ointment. An appendix gives tables listing many of the substances tested, vehicles or solvents used, test objects employed (rabbit, pig or man), type of test performed and the results obtained. Progress report under Contract 9-280, OEMsr-434, with the Rockefeller Institute for Medical Research.

MCNAMARA, BERNARD P. Systemic thallium poisoning: A review of the literature. (Chemical Warfare Service. Medical Division Report 15.) Off. Pub. Bd., Report, PB 4044. 1944. 14 pp. Price: Microfilm, 50c.; Photostat, $1.00.

Thallium is one of the most toxic of all metals. It causes general protoplasmic poisoning affecting almost every organ and body secretion. Methods of treatment (pilocarpine being the most popular antidote) are described, but evidence on the results obtained is not convincing. This report reviews the literature on thallium poisoning and contains a bibliography with 93 entries.

THOMSON, JOHN F., GOLDWASSER, EUGENE, AND SAVIT, JOSEPH. Tests for decontamination of Lewisite on human skin. (OSRD Report 3501.) Off. Pub. Bd., Report, PB 4197. 1944. 50 pp. Price: Microfilm, 50c.; Photostat, $4.00. Data are given on the effect of the contamination, and tables give merits of the several compounds tested. BAL (2,3-dimercaptopropanol) proved more effective than most of the other dithiols. Peroxides also were tested.

U.S. WAR DEPARTMENT. Supply of special appliances and prostheses. (Supply Bulletin SB 8-28.) Off. Pub. Bd., Report, PB 1166. 1945. 6 pp. Price: Microfilm, 50c.; Photostat, $1.00.

This bulletin has been compiled for the purpose of providing supply personnel in the Medical Department with a ready reference concerning the supply of special appliances and prostheses, such as artificial eyes, artificial limbs, hearing aids, special measurement shoes, and braces. Procurement procedures are outlined.

WRIGHT, SEWALL, *et alii*. Analysis of variations in size of blister after application of H. (OSRD Report 3943.) Off. Pub. Bd., Report, PB 4196. 1944. 19 pp. Price: Microfilm, 50c.; Photostat, $2.00.

The purpose of this analysis, made at the request of the Medical Division, Office of the Chief, Chemical Warfare Service, was to evaluate some of the factors that affect the occurrence and size of skin lesions resulting from small doses of mustard. The results indicated a slight but direct relationship between size of blister and certain environmental factors, namely, indoor temperatures and indoor humidity. This is a progress report of work done at the University of Chicago. Tables and graphs are included.

BENSON, OTIS O., JUNIOR. Effect of centrifugal force on posture, vision and consciousness. (Army Air Forces. Experimental Engineering Section. EXP-M-54-653-41B.) Off. Pub. Bd., Report, PB 5112. 1941. 4 pp. Price: Microfilm, 50c.; Photostat, $1.00.

The posture of the aircrew members at the time the centrifugal force is applied is very important in determining the blackout threshold. The average trained young pilot sitting nearly erect has a "G" threshold of approximately 5-5.5G when the stress is applied for four seconds. An extension of the time force as applied disturbs the all-important G-time relationship and lowers the force (G) value at which visual disturbances occur. The hydrostatic suit appears to raise the blackout thresholds.

British Medical Association News.

SCIENTIFIC.

A MEETING of the New South Wales Branch of the British Medical Association was held on June 20, 1946, at the Royal North Shore Hospital of Sydney. The meeting took the form of a number of clinical demonstrations by members of the honorary medical staff of the hospital.

Xanthoma Diabeticorum.

DR. W. W. INGRAM showed a female patient, aged forty-nine years. Five years earlier she had noticed yellow nodules the size of a pin's head on the left elbow; they spread slowly down the left arm, and six months later they were present on the hands, the feet and the right arm. Later they appeared on the buttocks and knees. The nodules were not painful, but were tender on pressure, and interfered with the patient's housework and walking. At first the urine was not examined for sugar, but when it was tested one year later, sugar was found to be present.

On examination of the patient, multiple nodules were found on both hands, both forearms to the elbows, both feet, both legs and both buttocks; the nodules varied from two to four millimetres in diameter, and were yellow in colour, hard and irregular. No abnormality was detected in the heart or lungs; the systolic blood pressure was 140 millimetres of mercury and the diastolic blood pressure was 90.

On the patient's admission to hospital, the urine was found to contain glucose but no acetone or albumin, and the blood sugar content was 256 milligrammes *per centum*. A sugar tolerance test produced a diabetic type of curve. On June 13, 1946, the blood cholesterol content was 520 milligrammes *per centum*, the normal figure being 100 to 200 milligrammes *per centum*. On June 12 a blood count gave the following information: the erythrocytes numbered 4,790,000 per cubic millimetre, the hæmoglobin value was 97% (14·55 grammes per 100 millilitres), and the colour index was 1·01; the leucocytes numbered 6,350 per cubic millimetre, 67·5% being neutrophile cells, 1·5% eosinophile cells, 0·5% basophile cells, 24·5% lymphocytes and 6·0% monocytes. On the same day the patient's blood was tested for the sugar content and her urine for its sugar and acetone content. The blood sugar content was found to be 180 milligrammes *per centum*, and then 50 grammes of glucose were given orally in 100 millilitres of water; after half an hour the blood sugar content was 241 milligrammes *per centum*; after one hour the figure was 481 milligrammes *per centum*; after one and a half hours the figure was 308 milligrammes *per centum*; and after two hours the figure was 322 milligrammes *per centum*. Before the glucose was ingested, the patient's urine contained a fair amount of sugar; the amount was increased after one hour and after two hours. Before the patient took the glucose, her urine contained large amounts of acetone; one hour later it contained the same amount, and one hour later again the amount of acetone had been considerably reduced.

A portion of a nodule was removed for pathological examination. Under the microscope it was found to contain irregularly distributed collections of polyhedral cells with vacuolated cytoplasm in the dermis. In some areas these cells had degenerated, leaving unorganized deposits of lipoid, which appeared as clear spaces in the section. The appearances were those of a cutaneous xanthoma.

Virilism.

DR. F. A. E. LAWES showed a female patient, aged thirty-one years, who had attended the medical out-patient department on July 21, 1941, complaining of headache, nausea, vomiting, giddiness and weakness, of three weeks' duration. She felt the cold excessively, but sweated freely in summer. She had been confined three and a half months previously, and did not feed her infant naturally. No menstrual disturbance had occurred. Some pallor of the mucous membranes was observed, and the thyreoid gland was enlarged. The patient was treated as suffering from neurosis.

On April 14, 1943, she attended the surgical out-patient department, complaining of a sore throat, pain between the shoulders and soreness of the front of the chest; she had no cough. The menstrual periods occurred regularly every twenty-eight days and lasted for two to four days. On examination, the patient was seen to be a big woman with a tendency to hirsutism. The isthmus and inferior lobe of the thyreoid gland were swollen. No tremor was present and no eye signs were observed. The patient thought that her weight was increasing. An appointment was made for the estimation of her basal metabolic rate, but she did not attend.

On February 19, 1945, the patient reappeared at the medical out-patient department, complaining of swimming feelings in the head. Her weight was thirteen stone eight pounds; she had gained about one stone in a year. Her height was 66·5 inches. Her menstrual periods had become irregular; they occurred at more frequent intervals, and the flow was more scanty than usual; the periods lasted for two or three days.

On examination of the patient, facial hirsuties and obesity were present. The thyreoid gland was enlarged. The systolic blood pressure was 130 millimetres of mercury and the diastolic pressure 110. The basal metabolic rate was −17% and the blood cholesterol content was 155 milligrammes *per centum*. The facial hirsutism was more noticeable than previously. Two months later she was again examined at the out-patient department; her weight had further increased. Some œdema of the legs was present. X-ray examination of the lumbar and lower thoracic segments of the spine revealed no abnormality. Both ocular fundi were normal and the cranial nerves were intact. Menstruation was unaltered, but sexual functions were absent. X-ray examination of the *sella turcica* revealed no abnormality. An attempt at perirenal insufflation of air was unsuccessful.

Dr. Lawes said that a further attempt would be made at perirenal insufflation of air. The patient was shown because she had not a well-developed syndrome, but a condition typical of many women who suffered from obesity and facial hair. The absence of hypertension, of amenorrhœa, of osteoporosis and of abdominal striæ excluded Cushing's syndrome. Dr. Lawes thought that the patient had no tumour, but was probably suffering from hyperplasia of the basophile cells of the pituitary gland. She was to be kept under observation. She was taking small doses of thyreoid extract, but up to the time of the meeting she had derived no benefit from it.

Dr. Lawes, with Dr. B. T. Shallard, also showed a female patient, aged twenty years. On December 6, 1944, the patient had complained of headache and amenorrhœa of one year's duration. She had been fat since the age of four years, and had taken up to eighteen grains of thyreoid extract per day with no effect. Her face, arms and legs had been hairy for some years. The menarche had occurred at the age of twelve years; her menstrual periods had been regular for the next two years, and had then become irregular; they occurred about every five or six months and lasted a full seven days. Twelve months prior to the meeting the patient began to suffer from frontal headache, which lasted for five or six hours and was associated with blurring of vision. Her last menstrual period had occurred twelve months earlier.

On examination, the patient was seen to be an obese girl with a masculine type of face. The hair was of male distribution. The systolic blood pressure was 170 millimetres of mercury and the diastolic pressure 140. It was impossible to palpate any abdominal mass, but a small tumour, which was slightly irregular and moved with respiration, was thought to be present in the right loin. Vaginal examination revealed no abnormality. Large distended vessels were found in the right optic fundus, but there was no œdema or atrophy; the left fundus was normal and the visual fields appeared to be intact. A plain X-ray examination of the adrenal glands revealed no abnormality. Excretion pyelography gave normal findings. The basal metabolic rate was −7%. On two occasions the urine was tested for androgens; the amounts of 17-ketosteroids excreted per twenty-four hours were respectively 13·5 and 11·9 milligrammes. The Aschheim-Zondek test failed to produce a reaction.

On January 31, 1945, the patient was menstruating, the flow being slight; this was the first menstrual period for a year. On March 12, 1945, she was admitted to hospital. Perirenal insufflation of air revealed no abnormality; X-ray examination of the pituitary fossa also gave normal findings. Lumbar puncture was performed on three occasions; the pressure of the cerebro-spinal fluid in millimetres of water was on these occasions respectively 270, 190 and 180; the fluid contained, per 100 millilitres, 20 milligrammes of protein, 10 milligrammes of chlorides and 52 milligrammes of sugar. A glucose tolerance test was performed; the blood sugar level before the ingestion of glucose was 135 milligrammes *per centum*; later figures, in milligrammes *per centum*, were as follows: half an hour and one hour after the ingestion of glucose, 180; one and a half hours and two hours after the ingestion of glucose, 158.

Whilst she was in hospital, the patient was given a diet of 800 Calories per day; her weight fell from fifteen stone fourteen ounces to thirteen stone six ounces. She was discharged from hospital on June 30, 1945, having been treated with progesterone and stilbœstrol. On July 3 the menses reappeared, and they continued to occur at intervals of three months. Further hormonal therapy was begun on April 30, 1946, but the menses had not reappeared up till the time of the meeting. The systolic blood pressure was 195 millimetres of mercury and the diastolic pressure 125. The comment was made that the condition had not advanced and that the patient did not feel any worse. The question to be decided was whether she had an adrenal tumour or pituitary basophilism. The small tumour that had been noticed previously was no longer to be felt. If an adrenal tumour had been present, it would have been expected that the condition would advance. It was stationary, no tumour was to be felt, and no operation was recommended at present. A further period of observation was necessary before a course of action was decided on.

(To be continued.)

NOTICE.

THE General Secretary of the Federal Council of the British Medical Association in Australia has announced that the following medical practitioners have been released from full-time duty with His Majesty's Forces and have resumed civil practice as from the dates mentioned:

Dr. E. Collins, "Braithwaite", Tindale Road, Artarmon (March 4, 1946).

Dr. H. A. Sweetapple, 217, Macquarie Street, Sydney (June 18, 1946).

Dr. F. B. Halliday, 185, Macquarie Street, Sydney (July 8, 1946).

Post-Graduate Work.

THE POST-GRADUATE COMMITTEE IN MEDICINE IN THE UNIVERSITY OF SYDNEY.

Winter Lectures at Sydney.

THE Post-Graduate Committee in Medicine in the University of Sydney wishes to announce the concluding lectures in the 1946 programme of winter lectures as follows:

Monday, July 29, *at* 5 *p.m.*—"Medical Education in Russia", by Professor Eric Ashby, Professor of Botany, the University of Sydney.

Monday, August 5, *at* 4.30 *p.m.*—"Modern Methods of Teaching" (illustrated by films), by Professor G. S. Browne, Professor of Education of the University of Melbourne.

Monday, August 12, *at* 4.30 *p.m.*—"Diagnostic Problems in Pulmonary Tuberculosis", by Dr. H. Maxwell James, Department of Health, Melbourne.

All these lectures, which form part of the Annual General Course conducted by the committee, will take place in the Stawell Memorial Hall, 145, Macquarie Street, Sydney. Service medical officers are invited to attend this programme, and inquiries may be made by communicating with the Secretary of the Post-Graduate Committee in Medicine, 131, Macquarie Street, Sydney. Telephones: BW 7483-B 4606.

Post-Graduate Courses.

A course for general practitioners is at present in progress and will be completed on September 7, 1946. A further course will begin on September 23 for twelve weeks. Fee: £2 12s. 6d. per week.

A course in advanced medicine is now in progress until August 23, 1946. Fee: £2 12s. 6d. per week.

A course for candidates sitting for the diploma in clinical pathology will begin on July 29 for twelve weeks and is limited to twelve candidates. Fee: £15 15s.

Courses for candidates sitting for Parts II of the degree of Master of Surgery of the University of Sydney and diplomas in ophthalmology, laryngology and oto-rhinology, and gynæcology and obstetrics begin for twelve weeks on July 29. Fee: £31 10s. each course. The last-mentioned course is recommended to candidates who intend to sit for the M.R.C.O.G. examination which will take place in February, 1947.

Courses for candidates sitting for Parts I of the degree of Master of Surgery of the University of Sydney and diplomas in ophthalmology, laryngology and oto-rhinology, and gynæcology and obstetrics will begin on September 16 for about eight weeks. Fee: £26 5s. (part time).

A course for candidates sitting for Part I of the diploma in psychological medicine will also begin on September 16, the fee for which will be announced later.

Courses for the diplomas in anæsthesia and radiology will begin in March, 1947.

Country Courses.

The following week-end course will be held at Lismore on August 3 and 4 in conjunction with the North-Eastern Medical Association:

Saturday, August 3.—2 p.m.: Meeting, North-Eastern Medical Association at the Lismore Council Chambers. 4.30 p.m.: "Diagnosis of Pulmonary Tuberculosis", by Dr. Bruce White, at the Lismore Council Chambers. 8.30 p.m.: "Cæsarean Section", by Professor Bruce T. Mayes, at the Commercial Hotel.

Sunday, August 4.—9.30 a.m.: "Treatment of Pulmonary Tuberculosis", by Dr. Bruce White, at the Lismore Base Hospital. 11 a.m.: "The Rh Factor in Pregnancy", by Professor Bruce T. Mayes, at the Lismore Council Chambers. 2 p.m.: "Recent Advances in Treatment of Sterility", by Professor Bruce Mayes, at the Lismore Council Chambers.

The fee for this course is £1 1s., and applications should be sent to Dr. M. R. Robertson, Honorary Secretary of the Association, at Lismore. Service medical officers are invited to attend free of charge.

WEEK-END COURSE IN SURGERY AT ADELAIDE.

THE Adelaide Post-Graduate Committee in Medicine announces that the following intensive week-end course has been arranged for August 31 and September 1. The subject will be abdominal emergencies with particular reference to intestinal obstruction. The course will be held in the Verco Lecture Theatre, Institute of Medical and Veterinary Science, Adelaide. The programme will be as follows:

Saturday, August 31, 1946.—2.15 p.m. to 3.15 p.m.: "Surgical Anatomy of the Peritoneum", Professor A. A. Abbie. 3.45 p.m. to 5 p.m.: "Clinical Aspects of Acute Abdominal Emergencies", Dr. L. C. E. Lindon. 8 p.m. to 8.30 p.m.: "Anæsthesia in Intestinal Obstruction", Dr. Gilbert Brown. 8.30 p.m. to 9.30 p.m.: "Pathological, Biochemical and Physiological Changes in Acute Abdominal Conditions, with Particular Reference to Prolonged Obstruction", Professor E. R. Trethewie.

Sunday, September 1, 1946.—10 a.m. to 11 a.m.: "Diagnosis and Treatment of Acute Intestinal Obstruction", Dr. I. B. Jose. 11 a.m. to 12 (midday): Demonstration of duodenal suction drainage, and intravenous therapy, Dr. N. J. Bonnin.

The fee for the course will be three guineas for men engaged in private practice during the past three years and two guineas for more junior men and those recently discharged from the services. Applications, accompanied by cheques, should reach the Registrar, University of Adelaide, not later than August 21.

Correspondence.

THE CONSULTATIVE COUNCIL FOR POLIOMYELITIS FOR VICTORIA.

SIR: Last February the Minister for Health, Mr. Barry, appointed a Consultative Council for Poliomyelitis for Victoria to act as a permanent body. The members are: Dr. W. G. D. Upjohn (chairman), Dr. F. Scholes, Dr. C. Merrilees, Mr. J. G. Norris, Mr. C. H. Hembrow, Mr. J. B. Colquhoun, Dr. Jean Macnamara, Mr. N. Neep (secretary).

Though regulations covering the powers and activities of the council have not yet been gazetted, the council has been able to arrange for some amelioration of the difficulties which have beset persons paralysed by poliomyelitis within the past fourteen months. Consultant orthopædists have been sent to six country base hospitals, where groups of paralysed patients are receiving after-care. Two visits have been made to each centre and similar assistance has been offered to all base hospitals.

An itinerant physiotherapist has commenced work in the district between Springvale and Warragul. Arrangements

for her services to patients in the district can be made by the doctor with the secretary of the council, Mr. N. Neep, at Fairfield Hospital.

The council stresses the importance of the so-called "mild" cases, where paralysis, though localized or not severe, can have far-reaching effects on the economic future of the patient. It is more important to give muscles of 70% to 80% efficiency the opportunity to quickly become 100% than to concentrate care on severely paralysed cases. Moreover, in uncared-for cases two factors, fatigue from early weight-bearing and stretching of important muscles, result in the development of unnecessary deformities and add to the damage done by the virus of poliomyelitis.

Representations made by the Council to the Victorian Division of the Australian Red Cross have resulted in the generous offer of temporary accommodation in Red Cross hostels for milder cases. Eight beds are available for males over the age of fourteen, eight for women and four for children. Each woman and child should be accompanied by an adult to learn the details of instructions to be carried out at home after splints have been fitted. The hostels are not equipped or staffed to cope with severely paralysed patients who demand much nursing attention. Arrangements for admission to Red Cross hostels should be made with the Almoner, Victorian Society for Crippled Children, 47, Queen Street, Melbourne, C.1, MU 5508.

The Victorian Society for Crippled Children is cooperating with the council and with the Red Cross to help these patients in many ways: arranging transport, the provision of prams or wheel beds, vocational guidance tests, occupation or training to help in rehabilitation.

The council commends the way Fairfield Infectious Diseases Hospital has cared for the 220 patients admitted within the past year, and also for the manner in which the Children's Hospital has accepted responsibility for all the metropolitan children who seek the aid of the hospital, and for the country children who have been cared for at Frankston and Hampton.

The absence of an orthopædic hospital for adults in Melbourne has thrown an unfair burden of the after-care on Fairfield Hospital.

Yours, etc.,

W. G. D. UPJOHN,
Chairman, Consultative Council for Poliomyelitis for Victoria.

12, Collins Street,
Melbourne,
July 10, 1946.

MONILIAL VAGINITIS.

SIR: In Dr. McIlrath's article on the above subject in THE MEDICAL JOURNAL OF AUSTRALIA of July 13, 1946, she does not mention the use of boric acid as a treatment.

I have found it the most reliable method. The patient is swabbed with *Glycerinum Acidi Borici*, and shown how to insert cottonwool swabs soaked in *Glycerinum Acidi Borici*, and is told to douche, and bathe parts with a solution of boric acid powder.

The first patient in whom I recognized the condition had been under treatment for years by a specialist without permanent benefit. No treatment I used did much good until I bethought myself of the use of boric acid in cases of thrush, and was then rewarded with a quick improvement.

Though occurring during pregnancy, it also occurs in women who have never been pregnant. In one case at least I thought that the infection came from a new unwashed pair of artificial silk bloomers.

The clinical appearance of many of these cases is diagnostic—the irritation, the redness combined with an opaque-white flaky discharge can hardly be anything else. There is not always redness either.

Yours, etc.,

MARY C. DE GARIS.

268, Latrobe Terrace,
Geelong,
July 13, 1946.

PATENT DUCTUS ARTERIOSUS.

SIR: In the issue of THE MEDICAL JOURNAL OF AUSTRALIA dated July 6, 1946, appears a report of the Melbourne Pædiatric Society in which the condition of patent *ductus arteriosus* is discussed. Dr. Southby refers to a case in which the closure of the ductus failed, and Dr. Penington mentions two cases in which the murmur reappeared after operation. Both these cases, and they are really only two cases, were operated upon early in 1944 by Major Gebauer of the Fourth American General Hospital, one in Melbourne and the other in Perth. On both occasions simple ligature was used *plus* wrapping with "Cellophane". If the literature is examined, it will be found that considerable technical improvements have been introduced by Gross and by Blalock since the time at which the quoted operations were performed. Gross now divides the ductus and oversews the ends when recurrence is impossible, and Blalock inserts purse string sutures and transfixion ligatures which render reopening extremely unlikely. It would appear, therefore, that Dr. Southby and Dr. Penington are criticizing a surgical operation that has been abandoned some considerable time.

Dr. Penington states that "Cellophane" was used to produce *endarteritis obliterans* and that the rationale was not clear. In defence of Gebauer I would like to state that the use of "Cellophane" rested on the result of experiment. He had found that if a kidney was wrapped in "Cellophane" and returned to the body with the idea of preventing the establishment of an anastomotic circulation, then a constrictive fibrosis took place and chronic nephritis resulted. In view of this result, it was used in the treatment of patent ductus in the hope that a similar fibrosis would occur.

I am writing this letter with the object of drawing attention to the danger of condemning an operation in a field of surgery that is advancing at such a rate that a method used two years ago is no longer considered satisfactory.

Yours, etc.,

ROBERT H. ORTON,
Anæsthetist to the Thoracic Unit, Alfred Hospital, Melbourne.

12, Collins Street,
Melbourne,
July 14, 1946.

Australian Medical Board Proceedings.

QUEENSLAND.

THE undermentioned have been registered, pursuant to the provisions of *The Medical Acts*, 1939 to 1940, of Queensland, as duly qualified medical practitioners:

Barnes, John Handyside, M.B., B.S., 1946 (Univ. Queensland), 435, Gregory Terrace, Brisbane.

Cameron, Malcolm Elwyn, M.B., B.S., 1946 (Univ. Queensland), Victoria Avenue, Chelmer, S.W.3, Brisbane.

Catsoulis, Kosmas Charles, M.B., B.S., 1946 (Univ. Queensland), 47, Robertson Street, Valley, N.1, Brisbane.

Clements, James Ernest, M.B., B.S., 1946 (Univ. Queensland), King's College, Kangaroo Point, Brisbane.

Clewett, Pamela Mary, M.B., B.S., 1946 (Univ. Queensland), 119, West Street, Toowoomba.

Crawford, Arthur Pinkerton, M.B., B.S., 1946 (Univ. Queensland), 17, Peary Street, Northgate, N.E.3, Brisbane.

Dark, Ronald John Cranstoun, M.B., B.S., 1946 (Univ. Queensland), Dover Street, Wilston, Brisbane, N.W.1.

Fitzgerald, Brian, M.B., B.S., 1946 (Univ. Queensland), Rose Street, Eagle Junction, Brisbane.

Forster, John Ernest, M.B., B.S., 1946 (Univ. Queensland), 6, Tozer Street, Toowoomba.

Gibbs, Wylie Talbot, M.B., B.S., 1946 (Univ. Queensland), 35, Thorn Street, Ipswich.

Gohstand, Lillian, M.B., B.S., 1946 (Univ. Queensland), Samford Road, Alderley, Brisbane.

Goldman, Naphtali, M.B., B.S., 1946 (Univ. Queensland), 102, Bonney Avenue, Clayfield, Brisbane.

Jones, Harry Cowell, M.B., B.S., 1946 (Univ. Queensland), Atthow Avenue, Ashgrove, Brisbane.

Junner, Margaret Jessie, M.B., B.S., 1946 (Univ. Queensland), 35, Inwood Street, Wooloowin, Brisbane.

Landy, Pete James Bunworth, M.B., B.S., 1946 (Univ. Queensland), 175, Adelaide Street, Clayfield, Brisbane.

Macdonald, Jean, M.B., B.S., 1946 (Univ. Queensland), 63, Alexandra Road, Ascot, Brisbane.

Neill, Donald George, M.B., B.S., 1946 (Univ. Queensland), 39, Russell Street, South Brisbane.

Ottone, Alfio, M.B., B.S., 1946 (Univ. Queensland), Box 57, Mossman, North Queensland.

Tuffley, Donald James, M.B., B.S., 1946 (Univ. Queensland), Mackay.

Urquhart, Ian Wylie, M.B., B.S., 1946 (Univ. Queensland), 104, Jubilee Terrace, Bardon, W.4, Brisbane.
Ward, John Dudley, M.B., B.S., 1946 (Univ. Queensland), 119, Wynnum Road, Norman Park, Brisbane.
Webster, Thomas Mortimer, M.B., B.S., 1946 (Univ. Queensland), Princess Street, Dutton Park, Brisbane.
Wilson, Brian Gilmore, M.B., B.S., 1946 (Univ. Queensland), 57, Chatsworth Road, Greenslopes, Brisbane.
Fruchtmann, Robert, M.B., B.S., 1946 (Univ. Queensland), 24, Moray Street, New Farm, Brisbane.
Watt, Ronald David, M.B., B.S., 1946 (Univ. Queensland), 11, Henry Street, Ascot, Brisbane.
Windsor, John Clement, M.B., B.S., 1946 (Univ. Queensland), "Knock-Brid", Gregory Terrace, Valley, N.1, Brisbane.
Johnston, Edward Douglas, M.B., B.S., 1946 (Univ. Queensland), Lands Office, Cloncurry.
Williams, Evan Ross Landeg, M.B., B.S., 1945 (Univ. Sydney), 19, Ludlow Street, Hamilton, Brisbane.

NEW SOUTH WALES.

THE undermentioned have been registered, pursuant to the provisions of the *Medical Practitioners Act*, 1938-1939, of New South Wales, as duly qualified medical practitioners:

Barry, Hugh Collis, M.R.C.S., L.R.C.P., 1938, F.R.C.S. (England), 1940, F.R.A.C.S., 1945, 137, Macquarie Street, Sydney.
Brewer, Henry Leo, M.B., B.S., 1932 (Univ. Melbourne), F.R.C.S. (England), 1941, Orange Grove, Mudgegonga, Myrtleford, Victoria.
Colville, Leslie Charles George, M.B., B.S., 1941 (Univ. Melbourne), Byron Bay.
Hadley, John Charles George, M.B., B.S., 1938 (Univ. Melbourne), 169, Sailors Bay Road, Northbridge, New South Wales.
Roden, Peter John, L.M.S.S.A. (London), 1945, c.o. McDonald Hamilton and Company, George Street, Sydney.

The following additional qualifications have been registered:

Armstrong, Allan Cameron, 217, Macquarie Street, Sydney (M.B., Ch.M., 1926, Univ. Sydney), M.Ch. (Orth.), Liverpool, 1930, F.R.C.S., Edinburgh, 1931.
Clouston, Thomas Moore, 52, Almora Street, Mosman (M.B., B.S., 1930, Univ. Sydney), D.T.M., D.T.H., 1944, Univ. Sydney.
Hertzberg, Reuben, 1, Bardsley Gardens, North Sydney (M.B., 1939, Univ. Sydney), Dip.Oph. (Melbourne), 1946.
Stening, Malcolm James Lees, 143, Macquarie Street, Sydney (M.B., B.S., 1936, Univ. Sydney), F.R.C.S. (England), 1940, F.R.A.C.S., 1943, M.D., 1944, Univ. Sydney.
Wilson, Francis Henry Hales, 217, Macquarie Street, Sydney (M.B., 1928, Univ. Sydney), M.R.A.C.P., 1946.

Nominations and Elections.

THE undermentioned have applied for election as members of the New South Wales Branch of the British Medical Association:

Tonkin, John Richard, M.B., B.S., 1941 (Univ. Sydney), 34, Moseley Street, Strathfield.
King, Keith John McInnis, M.B., B.S., 1941 (Univ. Sydney), 34, Fort Street, Petersham.
Billington, Brian Price, provisional registration, 1946 (Univ. Sydney), 7, Amarna Parade, Roseville.
O'Connell, Brian Patrick, M.B., B.S., 1945 (Univ. Sydney), St. Vincent's Hospital, Darlinghurst.
Potts, Gordon Cameron, M.B., B.S., 1941 (Univ. Sydney), Dubbo Base Hospital, Dubbo.
Mayer, Loris Lucy, M.B., B.S., 1944 (Univ. Sydney), Dubbo Base Hospital, Dubbo.

The undermentioned have been elected as members of the New South Wales Branch of the British Medical Association:

Bauer, Gaston Egon, provisional registration, 1946 (Univ. Sydney), Royal Prince Alfred Hospital, Camperdown.
Barrett, William Joseph, M.B., B.S., 1943 (Univ. Sydney), 51, Fitzwilliam Road, Vaucluse.
Burfitt-Williams, Grosvenor Charles Thomas, provisional registration, 1946 (Univ. Sydney), Lewisham Hospital, Lewisham.
Calnan, Gordon Sylvester, provisional registration, 1946 (Univ. Sydney), Grafton Base Hospital, Grafton.
Colvin, Cecil Brereton, M.B., B.S., 1942 (Univ. Sydney), Newcastle Street, East Maitland.
Crowe, Marie Josephine, M.B., B.S., 1943 (Univ. Sydney), "Riverwood", George's Hall, New South Wales.
Dawson, Lionel Adrian, M.B., B.S., 1945 (Univ. Sydney), Royal Prince Alfred Hospital, Camperdown.
Dey, Judith Elizabeth, provisional registration, 1946 (Univ. Sydney), Sydney Hospital, Sydney.
Donnan, Bruce Winston, provisional registration, 1946 (Univ. Sydney), Sydney Hospital, Sydney.
Doubleday, Leonard Charles, M.B., B.S., 1944 (Univ. Sydney), R.A.A.F., Garbutt, Townsville.
Falk, Keith Louis, M.B., B.S., 1944 (Univ. Sydney), West Wyalong.
Ferrari, Louis Norman, M.B., B.S., 1942 (Univ. Sydney), 3, Appian Way, Burwood.
Godden, Ruth Irene, provisional registration, 1946 (Univ. Sydney), St. George District Hospital, Kogarah.
Hambly, Colin Keith, M.B., B.S., 1941 (Univ. Sydney), Flat 4, 14, Pitt Street, Randwick.
Jennings, Alan Norman, M.B., B.S., 1945 (Univ. Sydney), Mental Hospital, Parramatta.
King, Errol Edward Trevor, M.B., B.S., 1945 (Univ. Sydney), 275, Edgecliff Road, Edgecliff.
Johnson, Maurice Herbert, M.B., B.S., 1943 (Univ. Sydney), c.o. 49, New South Head Road, Vaucluse.
McElhone, Mary Mabel, M.B., B.S., 1946 (Univ. Sydney), 30, Billyard Avenue, Elizabeth Bay.
Maderna, Hector Ernest, M.B., B.S., 1942 (Univ. Sydney), 13, Wilga Street, Fairfield.
Makinson, Jill, M.B., B.S., 1946 (Univ. Sydney), 45, Abbotsford Road, Homebush.
Maloney, John Bede, M.B., B.S., 1940 (Univ. Melbourne), 17, Gladswood Gardens, Double Bay.
Marrington, John Frederick, M.B., B.S., 1945 (Univ. Sydney), 9, Tivoli Street, Mosman.
Marsden, Hugh Ernest, M.B., B.S., 1941 (Univ. Sydney), Prince Henry Hospital, Little Bay.
Morris, Thomas, M.B., B.S., 1940 (Univ. Melbourne), c.o. Dr. D. N. Short, Blayney.
Murphy, Warren Ashton, M.B., B.S., 1946 (Univ. Sydney), Sydney Hospital, Sydney.
Prior, John, M.B., B.S., 1946 (Univ. Sydney), Lewisham Hospital, Lewisham.
Puflett, Delmont, M.B., B.S., 1945 (Univ. Sydney), 9, Glen Street, Milson's Point.
Ratcliff, Colin Ray, M.B., B.S., 1943 (Univ. Sydney), 15, Copeland Street, Beecroft.
Rosati, Philippo, M.B., B.S., 1941 (Univ. Sydney), 3, Bower Hall, Reddall Street, Manly.
Rothfield, Neville John, M.B., B.S., 1945 (Univ. Sydney), 24, Blaxland Road, Bellevue Hill.
Taylor, Benjamin John, M.B., B.S., 1945 (Univ. Sydney), 5, Beresford Road, Rose Bay.
Weekes, Hazel Claire, M.B., 1945 (Univ. Sydney), 30, Fairweather Street, Bellevue Hill.
White, Walter Barry, provisional registration, 1946 (Univ. Sydney), Marrickville District Hospital, Marrickville.

Obituary.

AUSTIN SYDNEY CURTIN.

WE regret to announce the death of Dr. Austin Sydney Curtin, which occurred on July 18, 1946, at Woollahra, New South Wales.

THE FEDERAL MEDICAL WAR RELIEF FUND.

THE following contributions to the Federal Medical War Relief Fund have been received:

Tasmania.

British Medical Association Compensation Fund (Tasmania)—Ida Birchall, Terence Butler, E. Brettingham-Moore, G. M. W. Clemons, C. Craig, W. L. Crowther, F. A. Ferris, F. W. Fay, T. Goddard, W. W. Giblin, L. Gollan, J. L. Grove, A. E. Grounds, G. L. H. Harris, W. P. Holman, B. Hiller, D. Klineberg, J. P. Miller, H. B. Moorhead (deceased), W. K. McIntyre, L. Macnamara, J. McDonald, J. A. Newell, A. Pryde, J. R. Robertson, Sir John Ramsay (deceased), J.

Sprent, J. S. D. Stevens, W. Smellie (deceased), C. G. Thompson, R. J. D. Turnbull, K. Wise, C. Walch, C. J. Walker, J. H. B. Walch, B. A. Anderson (deceased), E. J. Addison, H. Cordner (deceased), T. R. Gaha, A. M. le Souef, G. Sprott (deceased), H. T. Tisdall, G. A. Walpole (deceased), D. H. E. Lines, C. Hartley Rowe, C. M. Kingsmill, £785 16s. 6d.
Grand total: £13,880 9s.

Medical Appointments.

Dr. F. R. Hone has been appointed Honorary Physician and Dr. J. E. Hughes Honorary Assistant Surgeon at the Royal Adelaide Hospital, Adelaide.

Dr. G. R. Beattie has been appointed a member of the Board of Optical Registration under the provisions of Section 11 of the *Opticians Act*, 1913, of Tasmania.

Dr. F. B. Burnett has been appointed Government Medical Officer at Chinchilla, Queensland.

Dr. B. M. Carruthers has been appointed Government representative on the Committee of Management of the Peacock Convalescent Hospital, Hobart.

Dr. C. R. D. Brothers has been appointed Director of the State Psychological Clinic and Chairman of the Mental Deficiency Board of Tasmania.

Dr. George Frederick Lumley has been appointed a quarantine officer under the *Quarantine Act*, 1908-1924.

Dr. R. C. Angove and Dr. E. P. Cherry have been appointed Registrars, Royal Adelaide Hospital, Adelaide.

Dr. A. F. James has been appointed Medical Officer of Health of the Corrigin Road Board, Western Australia.

Dr. R. T. Allan has been appointed a member of the Indeterminate Sentences Board, pursuant to the provisions of Section 531 of the *Crimes Act*, 1928, of Victoria.

Dr. Nathaniel Frank has been appointed quarantine officer under the provisions of the *Quarantine Act*, 1908-1924.

Dr. E. Bishopverder has been appointed Medical Officer, Mental Hospitals Division, Department of Public Health, New South Wales.

Dr. C. B. Cox has been appointed an analyst within the meaning and for the purposes of the *Pure Food Act*, 1908, of New South Wales, as amended.

Books Received.

"A Short Practice of Surgery", by Hamilton Bailey, F.R.C.S. (England), F.I.C.S., and R. J. McNeill Love, M.S. (London), F.R.C.S. (England), F.I.C.S.; Seventh Edition; 1946. London: H. K. Lewis and Company Limited. 8½" × 5½", pp. 1106, with many illustrations, some coloured. Price: 40s. net.

"Rare Diseases and Some Debatable Subjects", by F. Parkes Weber, M.D., F.R.C.P.; 1946. New York and Toronto: Staples Press Limited. London: John Bale Medical Publications Limited. 8½" × 5½", pp. 174, with illustrations. Price: 15s.

"A Pocket Obstetrics", by Arthur C. H. Bell, M.B., B.S., F.R.C.S., M.R.C.O.G., Hon.M.M.S.A.; 1946. London: J. and A. Churchill Limited. 7¼" × 4¾", pp. 156, with 13 illustrations. Price: 7s. 6d.

"Introduction to Clinical Neurology", by Gordon Holmes, M.D., F.R.S.; 1946. Edinburgh: E. and S. Livingstone Limited. 9¼" × 6", pp. 192, with illustrations. Price: 12s. 6d.

"Cardiovascular Disease in General Practice", by Terence East, M.A., D.M. (Oxon.), F.R.C.P. (London); Second Edition; 1946. London: H. K. Lewis and Company Limited. 8½" × 5½", pp. 208, with many illustrations. Price: 12s. 6d.

"Theory and Practice of Nursing", by M. A. Gullan, S.R.N.; Fifth Edition; 1946. London: H. K. Lewis and Company Limited. 8½" × 5½", pp. 248, with illustrations. Price: 12s. 6d.

"Essays and Studies", by W. A. Osborne; 1946. Melbourne, Sydney, Adelaide: Lothian Publishing Company Proprietary Limited. 8½" × 5½", pp. 196. Price: 10s. 6d.

"The Results of Radium and X-Ray Therapy in Malignant Disease: Being the Second Statistical Report from the Holt Radium Institute, Manchester, now part of the Christie Hospital and Holt Radium Institute, Years 1934-1938 inclusive assessed at 5 years, and 1932 and 1933 assessed at 10 years, compiled by Ralston Paterson, Margaret Tod and Marion Russell"; 1946. Edinburgh: E. and S. Livingstone Limited. 9½" × 6", pp. 148. Price: 7s. 6d.

"The Causation of Appendicitis", by A. Rendle Short, M.D., B.S., B.Sc., F.R.C.S.; 1946. Bristol: John Wright and Sons Limited; London: Simpkin Marshall (1941) Limited. 7¾" × 5¾", pp. 88. Price: 10s.

"Narcotics and Drug Addiction", by Erich Hesse, M.D.; translated by Frank Gaynor; 1946. New York: Philosophical Library. 9" × 6", pp. 220. Price: $3.75.

"The Principles and Practice of Tropical Medicine", by L. Everard Napier; 1946. New York: The Macmillan Company. 9¾" × 6¼", pp. 935, with many illustrations. Price: $11.00.

Diary for the Month.

AUG. 2.—Queensland Branch, B.M.A.: Branch Meeting.
AUG. 6.—New South Wales Branch, B.M.A.: Organization and Science Committee.
AUG. 7.—Western Australian Branch, B.M.A.: Council Meeting.
AUG. 7.—Victorian Branch, B.M.A.: Branch Meeting.
AUG. 8.—South Australian Branch, B.M.A.: Council Meeting.
AUG. 9.—Queensland Branch, B.M.A.: Council Meeting.
AUG. 13.—New South Wales Branch, B.M.A.: Executive and Finance Committee.
AUG. 13.—Tasmanian Branch, B.M.A.: Ordinary Meeting.
AUG. 20.—New South Wales Branch, B.M.A.: Medical Politics Committee.
AUG. 21.—Western Australian Branch, B.M.A.: General Meeting.
AUG. 22.—New South Wales Branch, B.M.A.: Clinical Meeting.
AUG. 22.—Victorian Branch, B.M.A.: Executive Meeting.
AUG. 22.—South Australian Branch, B.M.A.: Council Meeting.
AUG. 23.—Queensland Branch, B.M.A.: Council Meeting.
AUG. 27.—New South Wales Branch, B.M.A.: Ethics Committee.
AUG. 28.—Victorian Branch, B.M.A.: Council Meeting.
AUG. 29.—South Australian Branch, B.M.A.: Scientific Meeting.
AUG. 29.—New South Wales Branch, B.M.A.: Branch Meeting.
SEPT. 3.—New South Wales Branch, B.M.A.: Organization and Science Committee.
SEPT. 4.—Western Australian Branch, B.M.A.: Council Meeting.

Medical Appointments: Important Notice.

MEDICAL PRACTITIONERS are requested not to apply for any appointment mentioned below without having first communicated with the Honorary Secretary of the Branch concerned, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

New South Wales Branch (Honorary Secretary, 135, Macquarie Street, Sydney): Australian Natives' Association; Ashfield and District United Friendly Societies' Dispensary; Balmain United Friendly Societies' Dispensary; Leichhardt and Petersham United Friendly Societies' Dispensary; Manchester Unity Medical and Dispensing Institute, Oxford Street, Sydney; North Sydney Friendly Societies' Dispensary Limited; People's Prudential Assurance Company Limited; Phœnix Mutual Provident Society.

Victorian Branch (Honorary Secretary, Medical Society Hall, East Melbourne): Associated Medical Services Limited; all Institutes or Medical Dispensaries; Australian Prudential Association, Proprietary, Limited; Federated Mutual Medical Benefit Society; Mutual National Provident Club; National Provident Association; Hospital or other appointments outside Victoria.

Queensland Branch (Honorary Secretary, B.M.A. House, 225, Wickham Terrace, Brisbane, B.17): Brisbane Associated Friendly Societies' Medical Institute; Bundaberg Medical Institute. Members accepting LODGE appointments and those desiring to accept appointments to any COUNTRY HOSPITAL or position outside Australia are advised, in their own interests, to submit a copy of their Agreement to the Council before signing.

South Australian Branch (Honorary Secretary, 178, North Terrace, Adelaide): All Lodge appointments in South Australia; all Contract Practice appointments in South Australia.

Western Australian Branch (Honorary Secretary, 205, Saint George's Terrace, Perth): Wiluna Hospital; all Contract Practice appointments in Western Australia. All government appointments with the exception of those of the Department of Public Health.

Editorial Notices.

MANUSCRIPTS forwarded to the office of this journal cannot under any circumstances be returned. Original articles forwarded for publication are understood to be offered to THE MEDICAL JOURNAL OF AUSTRALIA alone, unless the contrary be stated.

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